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A revision of the *Myopsalta crucifera* (Ashton) species group (Hemiptera: Cicadidae: Cicadettini) with 14 new species from mainland Australia

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Abstract

The genus *Myopsalta* Moulds is distributed throughout much of Australia. Previous studies have associated several undescribed species with the *Myopsalta crucifera* (Ashton) species complex. The present study informally divides the cicadas in the genus *Myopsalta* into two species groups. It provides a revision of the *M. crucifera* species group, which includes redescriptions of *M. crucifera* s. str. and *M. mackinlayi* (Distant). The identity of the latter species is further refined and attributed to material formerly presented under the name *Myopsalta atrata* (Goding & Froggatt). In addition to the redescriptions, 14 new species belonging to the *M. crucifera* species group are described, including *M. albiventris* **n. sp.**, *M. bassiana* **n. sp.**, *M. chrysopedia* **n. sp.**, *M. gordoni* **n. sp.**, *M. leona* **n. sp.**, *M. longicauda* **n. sp.**, *M. majurae* **n. sp.**, *M. melanobasis* **n. sp.**, *M. parvula* **n. sp.**, *M. platyptera* **n. sp.**, *M. riverina* **n. sp.**, *M. septa* **n. sp.**, *M. umbra* **n. sp.** and *M. xerograsidia* **n. sp.** A key to species in the genus *Myopsalta* is provided. Standard morphological descriptions and descriptions of calling songs unique to each species are included along with a discussion on different song types in the *M. crucifera* species group.

Key words: Auchenorrhyncha, bioacoustics, acoustic signalling, mating signals, song structure, song specificity, systematic taxonomy, identification key

Introduction

A recent review of the Australian cicada genera (Moulds, 2012) has contributed significantly to resolving the higher taxonomy of these insects. This review introduced a large number of new genera, particular in the tribe Cicadettini, which opened the field for additional taxonomic work. Indeed, it has already facilitated several recent taxonomic studies, redefining previously described genera and species and adding additional genera and/or species (e.g. Emery *et al.*, 2015a, b; Ewart *et al.,* 2015b; Owen & Moulds, 2016; Popple, 2017). Despite this attention, efforts to document the Australian cicada fauna continue to be work in progress.

The genus *Myopsalta* Moulds was introduced to accommodate eight Australian species (Moulds, 2012). Since then the identity of one of the species, *Myopsalta atrata* (Goding & Froggatt), has been redefined and two additional species were added (Emery *et al.*, 2015b). As a result, most of the previous material attributed to *M. atrata* was placed into uncertainty and Emery *et al.* (2015b) affiliated this material broadly with the *Myopsalta crucifera* (Ashton) species complex (herein referred to as the '*Myopsalta crucifera* species group').

Here, further revision is given to the genus *Myopsalta*, beginning with the recognition of two informal species groups. The identity of *Myopsalta crucifera* is redefined and this species, along with the related *M. mackinlayi* (Distant) is redescribed with reference to new material. In addition to the redescriptions, 14 new species allied to *M. crucifera* are described from eastern Australia. For each species, a full morphological description is provided, as well as documentation of their species-specific calling songs.

Material and methods

Specimen dissection and measurement procedures. Male genitalia were removed using a pair of surgical scissors and placed in a solution of 10% potassium hydroxide. The solution was either boiled for one hour or left overnight at room temperature to clear the soft tissues and provide a clean dissection. Following clearing, the specimens were washed with ethanol and placed into a solution of either 70% ethanol or glycerol. To facilitate close examination of internal structures, the preparation was viewed under 30x magnification.
Measurements were taken using a pair of Toledo vernier calipers (accurate to 0.1 mm).

Calling song recording techniques. Individual cicadas were recorded. At different times, different sets of equipment were used in different situations and by different recordists. Field recordings were used in preference to cicadas recorded in captivity except where otherwise not available. For simplicity, each recording system (RS) is detailed here:

RS1: Marantz PMD670 Solid State Recorder with Telinga Pro 6 Parabolic reflector and microphone.
RS2: Sony MZR700 minidisc recorder with Sony ECM-MS957 Electret Condenser microphone.
RS3: Sony WM-D6C Walkman with Sennheiser K6/ME66 microphone.
RS4: Sony MiniDisc Recorder MZ-NH900 with Telinga Pro 5 Parabolic reflector and microphone.
RS5: Tascam DR-07 digital recorder with an Audio-Technica
ATR-55 cardioid condenser shotgun microphone.
RS6: Tascam DR-40 digital recorder with Sennheiser K6/ME66 microphone.
RS7: Marantz PMD-660 Solid State Recorder with a Sennheiser K6/ME66 microphone.

Species descriptions. For each description, institution and private collection abbreviations are included in bold following entire series of insects stored in each repository (explanations are given in methods). Specimens were sourced from various institutions namely the Australian National Insect Collection (ANIC) in Canberra, the Australian Museum (AM) in Sydney, the Natural History Museum (NHM) in London, the Queensland Museum (QM) in Brisbane, the South Australian Museum (SAM) in Adelaide, The University of Queensland Insect Collection (UQIC, now housed at the QM), and the private collections of Max Moulds (MSM) in Kuranda, Tony Ewart (AE) in Caloundra, David Emery (DE) in Sydney, Noel Starick (NS) in Brisbane and the author of this paper (LWP) in Brisbane.

Morphological terminology follows Moulds (2005; 2012) for body structures and wing characters, Moulds (2005) for genitalia, and Dugale (1972) and Bennet-Clark (1997) for timbals. Measurements were taken from a representative sample of each sex (depending on availability) for the following features (abbreviations in parentheses): length of body (BL), length of fore wing (FWL), width of head including eyes (HW), width of pronotum across extremities of the lateral margins (PW), width of abdomen (AW), fore wing length-to-width ratio (FWL/W) and length of ovipositor (OL; females only).

Oscillograms of calling songs were prepared using Cool Edit Pro 2.0 and Corel Draw 9.0 software. Song terminology is modified from Ragge & Reynolds (1998) and Ewart & Marques (2008), with specific adjustments as follows. The term 'syllable' was used for the smallest unit appearing to comprise multiple 'in-out' movements of the timbals (typically 5–10 ms duration). (The production of single movements does not appear to be a feature of

Myopsalta calling songs.) Where 2–9 syllables coalesce, this was referred to as a 'macrosyllable'. Longer durations of continuous sound (≥10 syllables) were referred to as an 'echeme'. A period of silence following a syllable, macrosyllable or echeme is treated as a 'gap'. Where a series of syllables is produced without coalescence (i.e. with each syllable separated by a gap), this is referred to as a 'syllable sequence'.

The calling song descriptions and comparisons included in this paper are based upon durations of the song units described above from a set of available recordings. In addition to recordings obtained by the author, a small number of recordings provided by K.B.R. Hill and D.C. Marshall (University of Connecticut, U.S.A.) and a large library of recordings made available by A. Ewart (in Caloundra, Australia) were examined for comparative purposes, with the latter also used for illustration in some cases. A representative sample of recordings by the author and A. Ewart will be deposited at the online repository BioAcoustica (Baker *et al.*, 2015).

Species groups in the genus *Myopsalta*

In addition to *Myopsalta atrata*, *M. crucifera* and *M. mackinlayi*, all new species described in this paper belong to the *M. crucifera* species group. The remaining species are allocated to *M. binotata* species group, which is not given further treatment in this study (although all species are included in the morphological key, below). Lists of species for each of these informal groups, along with descriptions of their unifying morphological features, are provided as follows.

***Myopsalta binotata* species group** (hind wing plagas conspicuously white)
Myopsalta binotata (Goding & Froggatt)
Myopsalta coolahensis Emery, Emery & Popple
Myopsalta lactea (Distant, 1905)
Myopsalta libritor Emery, Emery & Popple
Myopsalta waterhousei (Distant)
Myopsalta wollomombii (Coombs)

***Myopsalta crucifera* species group** (hind wing plagas dull and grey-brown, pale brown or cream)
Myopsalta albiventris **n. sp.**
Myopsalta atrata (Goding & Froggatt)
Myopsalta bassiana **n. sp.**
Myopsalta chrysopedia **n. sp.**
Myopsalta crucifera (Ashton)
Myopsalta gordoni **n. sp.**
Myopsalta leona **n. sp.**
Myopsalta longicauda **n. sp.**
Myopsalta mackinlayi (Distant)
Myopsalta majurae **n. sp.**
Myopsalta melanobasis **n. sp.**
Myopsalta parvula **n. sp.**
Myopsalta platyptera **n. sp.**
Myopsalta riverina **n. sp.**
Myopsalta septa **n. sp.**
Myopsalta umbra **n. sp.**
Myopsalta xerograsidia **n. sp.**

Morphological key to species in the genus *Myopsalta*

The use of this key requires specimens to be examined with wings spread.

1. Fore wings hyaline with veins prominently infuscated almost throughout, or weakly infuscated at least along veins CuA and M 2
- Fore wings hyaline with veins not infuscated 4
2. Fore wing infuscations principally restricted to crossveins r and r-m (known from grasslands on Yorke Peninsula, South Australia) . . . . . *binotata*
- Fore wing infuscations present elsewhere and/or not restricted to crossveins r and r-m 3
3. Sternites pale brown; fore wings heavily to weakly infuscated (widespread in temperate grasslands of south-eastern South Australia, Victoria, New South Wales, the Australian Capital Territory and Queensland) . . . . . *waterhousei*
- Sternites black; fore wings heavily infuscated (known only from the original specimen collected from Melbourne, Victoria) . . . . . *lactea*
4. Fore wing basal membranes mainly white or grey 5
- Fore wing basal membranes light brown or orange 17
5. Fore wing basal cells partly opaque and dark brown adjacent to costa 6
- Fore wing basal cells hyaline 7
6. Sternite 3 (and sternites 4–6 in male) pale brown with a prominent central black marking (grasslands of the Coolah–Merriwa district of inland northern New South Wales) . . . . . *libritor*
- Sternite 3 entirely pale brown without a prominent central black marking (grasslands in the vicinity of Coolah, New South Wales) . . . . . *coolahensis*
7. Sternites entirely pale brown (grasslands on tablelands of far southern Queensland and northern New South Wales) . . . . . *wollomombii*
- Sternites not entirely pale brown 8
8. Male 9
- Female 13
9. Posterior margins of tergites conspicuously orange (restricted to Hawkesbury-Sandstone region of central New South Wales) . . . . . *atrata*
- Posterior margins of tergites pale brown to dark brown, not orange 10
10. Sternite VII pale brown, or dark brown centrally with contrasting pale brown margins (widespread in grasslands in dryer parts of Queensland, Northern Territory and Western Australia) . . . . . *xerograsidia*
- Sternite VII entirely dark brown to black 11
11. Head width >4.5 mm (widespread east of the wheat belt in south-west Western Australia) . . . . . *chrysopedia*
- Head width <4.5 mm 12
12. Sternites II and IV pale reddish-brown (known from woodlands and scrublands of inland southern Queensland) . . . . . *gordoni*
- Sternites II and IV almost entirely dark brown (known only from the Australian Capital Territory and eastern Victoria) . . . . . *parvula*
13. Ovipositor extends noticeably beyond posterior termination of abdominal segment 9 14
- Ovipositor does not extend beyond posterior termination of abdominal segment 9 (restricted to Hawkesbury-Sandstone region of central New South Wales) . . . . . *atrata*
14. Mesonotum black 15
- Mesonotum pale brown to dark brown 16
15. Head width <4.5 mm; ovipositor sheath extends <0.5 mm beyond apex of abdominal segment 9 (known only from the Australian Capital Territory and eastern Victoria) . . . . . *parvula*
- Head width >4.5 mm; ovipositor sheath extends approximately 2.0 mm beyond the apex of abdominal segment 9 (widespread east of the wheat belt in south-west Western Australia) . . . . . *chrysopedia*
16. Lateral edges of sternites pale brown (widespread in grasslands in dryer parts of Queensland, Northern Territory and Western Australia) . . . . . *xerograsidia*
- Lateral edges of sternites pale reddish-brown (known from woodlands and scrublands of inland southern Queensland) *gordoni*
17. Basal tenth of fore wing clavus opaque brown to dark brown 18
- Fore wing clavus entirely hyaline 22
18. Basal cell of each fore wing partly translucent brown or dark brown in distal corner (adjacent to costal vein and radial cell) 19
- Basal cells of each fore wing entirely hyaline (found in inland Queensland and New South Wales) . . . . . *leona*
19. Fore wing length <14.8 mm; tergites black (known only from the Australian Capital Territory and eastern Victoria) . . . . . *parvula*
- Fore wing length >14.8 mm; tergites partly brown 20
20. Male 21
- Female . . . . . *melanobasis* or *platyptera*
21. Lateral sides of tergite 8 dark brown to black, especially on anterior half (found in southern Queensland, mostly on inland side of Great Dividing Range) . . . . . *melanobasis*
- Lateral sides of tergite 8 diffusely brown throughout, slightly darker along anterior margin (known only from a site near Theodore in Queensland) . . . . . *platyptera*
22. Sternites VI and VII entirely pale brown (grassy woodlands of inland central and subcoastal south-east Queensland) . . . . . *albiventris*
- Sternites VI and VII dark brown to black centrally 23
23. Male 24
- Female 38
24. Sternite VII dark brown with a thin, pale brown margin on lateral and ventral sides 25

- Sternite VII dark brown to black throughout 28
25. Dorso-lateral sides of tergites black 26
- Dorso-lateral sides of tergites brown. 27
26. Found in grasslands of inland southern Queensland and northern New South Wales . . . . . *septa*
- Found in grassy woodlands of north Queensland, including Cape York . . . . . *crucifera* (dark form)
27. Fore wing costal veins light brown to light reddish-brown (found in coastal and subcoastal grasslands of Queensland and north-eastern New South Wales). . . . . *crucifera* (typical brown form)
- Fore wing costal veins brown (found in inland and subcoastal woodlands from southern Queensland to central New South Wales) . . . . . *mackinlayi*
28. Fore wing costal veins reddish-brown; dorso-lateral sides of tergites reddish-brown to ochraceous (restricted to semi-evergreen vine thickets of southern Queensland) . . . . . *umbra*
- Fore wing costal veins dull brown or dark brown; dorso-lateral sides of tergites brown to dark brown or black 29
29. Head width <4.6 mm 30
- Head width ≥4.6 mm 33
30. Opercula predominantly pale brown. . . . . *mackinlayi*
- Opercula predominantly dark brown to black. 31
31. Sternite III almost completely dark brown to black, with pale brown to reddish-brown colouration restricted to extreme lateral margins (known only from the Australian Capital Territory) . . . . . *parvula*
- Sternite III pale brown to reddish-brown laterally, with a contrasting dark brown marking centrally 32
32. Fore wing width >6.0 mm and/or with a length/width ratio <2.7 (found in coastal and tableland districts of New South Wales and the Australian Capital Territory)*bassiana*
- Fore wing width ≤6.0 mm and/or with a length/width ratio of >2.7 (found in inland Queensland and New South Wales) *leona*
33. Fore wings narrow with ratio of fore wing length/ fore wing width >2.9 (widespread east of the wheat belt in south-west Western Australia). . . . . *chrysopedia*
- Fore wings broad with ratio of fore wing length/ fore wing width <2.9. 34
34. Tergites 3–7 entirely black 35
- Tergites 3–7 black anteriorly with brown markings dorso-laterally on posterior half 37
35. Opercula predominantly pale brown to brown; lateral edges of sternites III–V reddish brown (found in mallee of inland New South Wales) . . . . . *riverina*
- Opercula predominantly dark brown to black; lateral edges of sternites brown or pinkish-brown (found in coastal and tableland districts of New South Wales and the Australian Capital Territory). 36
36. Sternite II black with pale brown colouration on ventro-lateral sides (found in coastal and tableland districts of New South Wales and the Australian Capital Territory) . . . . . *bassiana*
- Sternite II black with pinkish-brown to orange-brown colouration restricted to ventolateral posterior margins (restricted to the Australian Capital Territory). . . . . *majurae*
37. Lateral margins of sternites III–V a mixture of pale brown and orange-brown (found in woodlands of inland Queensland and New South Wales). . . . . *longicauda*
- Lateral margins of sternites III–V pale brown (found in coastal and tableland districts of New South Wales and the Australian Capital Territory). . . . . *bassiana*
38. Ovipositor sheath extends >1.5 mm beyond apex of abdominal segment 9. 39
- Ovipositor extends <1.5 mm beyond apex of abdominal segment 9 43
39. Ovipositor sheath extends >5.0 mm beyond apex of abdominal segment 9 (found in woodlands of inland Queensland and New South Wales) . . . . . *longicauda*
- Ovipositor sheath extends <5.0 mm beyond apex of abdominal segment 9. 40
40. Length of ovipositor sheath beyond apex of abdominal segment 9 greater than the length of abdominal segment 9 (restricted to grasslands of inland southern Queensland and northern New South Wales) . . . . . *septa*
- Extension of ovipositor sheath beyond apex of abdominal segment 9 is approximately equal to the length of abdominal segment 9 41
41. Mesonotum black (widespread east of the wheat belt in south-west Western Australia). . . . . *chrysopedia*
- Mesonotum pale brown to dark brown 42
42. Thorax pale brown (found in coastal and subcoastal grasslands of Queensland and north-eastern New South Wales). . *crucifera*
- Thorax dark brown or brown (found in inland Queensland and New South Wales) . . . . . *leona*
43. Ovipositor sheath extends <0.5 mm beyond apex of abdominal segment 9 (known only from the Australian Capital Territory and eastern Victoria) . . . . . *parvula*
- Ovipositor sheath extends approximately 1.0 mm beyond apex of abdominal segment 9. 44
44. Costa distinctly reddish-brown; tergites on dorso-lateral sides also reddish-brown (restricted to semi-evergreen vine thickets of southern Queensland) . . . . . *umbra*
- Costa dull brown, yellow-brown or pale brown; tergites on dorso-lateral sides brown to dark brown . . *bassiana* or *mackinlayi*

Systematics

Family Cicadidae

Subfamily Cicadettinae

Tribe Cicadettini

Genus *Myopsalta* Moulds, 2012

Type species. *Melampsalta crucifera* Ashton, 1912.

The diagnosis of this genus follows Moulds (2012), with the minor extensions of Emery *et al.* (2015b).

Myopsalta albiventris n. sp.

(Figs 1A, 2A, 3A, 3B, 4, 5, 6; Plate 1)

Types. Holotype: ♂ Expedition Range NP, 'Ampitheatre' campsite, 560 m, 25°12'S 148°59'E, 18.xii.1997, Evans, Burwell, open forest, QM Reg. No. T239565 (**QM**); **Paratypes**: QUEENSLAND: 1♂ Biggenden, Bluff Range, S. foothills, 9.xii.1972, H. Frauca; 1♂ Biggenden, Bluff Range, 13.i.1972, H. Frauca (**ANIC**); 3♂ Expedition Range NP, 'Amphitheatre' campsite, 560 m, 25°12'S 148°59'E, 17.xii.1997, C. Burwell & S. Evans, open forest; 12♂ 2♀ same data as holotype; 3♂ 1♀ Mt Moffatt NP, Top Shelter Shed, nr Mahogany Forest, 24°54'46"S 148°03'12"E, 1100 m, 22.xi.1995, C.J. Burwell (**QM**); 3♂ 2♀ The Amphitheatre, N.W. Robinson Gorge [Expedition Range] N.P., 25°12.07'S 148°59.43'E, Open forest (camp), 17.xii.1997; 2♂ 1♀ Mt Lind[e]say farm, [28°19.10'S 152°44.02'E], 12.xi.1971, in grass (**AE**); 2♂ Maroon Dam access road, 28.171219°S 152.651436°E, 4.i.2015, L.W. Popple (**DE**); 5♂ 1 km N. of Maroon Dam, 15.i.2003, L.W. & J.M. Popple, 285-0001 to 285-0004, 285-0008; 3♂ 1 km N. of Maroon Dam, 11.i.2003, L. Popple & R. MacSloy, 285-0005 to 285-0007; 1♂ Kennif Cave area, Mt Moffatt NP, 25°52'16"S 148°00'37"E, 16.i.2005, L.W. Popple, recorded, 285-0009; 1♂ Maroon Dam access road, 28.171219°S 152.651436°E, 4.i.2015, L.W. Popple, 285-0010 (**LWP**); NEW SOUTH WALES: 1♂ 'Tuglo', 48 km N. of Singleton, N.S.W., 8.xii.1981, B.J. Day (**AM**); 5♂ 3♀ Upper Eden Ck, Kyogle, 14.xi.1965, M.S. Moulds (**MSM**).

Etymology. The name is a feminine compound adjective of the Latin words *albus*, meaning 'white', and *venter*, meaning 'belly'. This refers to the almost entirely pale sternites of this species, a feature that is atypical in the *M. crucifera* species group.

Description. Male. (Figs 1A, 2A, 3A, 3B; Plates 1A, 1B).

Head: Postclypeus predominantly black, brown to pale brown on margins and on anterior medial line, and sometimes over much of dorsal side; supra-antennal plates a mixture of dark brown and brown to pale brown; genae and mandibular plates black, with silver pubescence; vertex and frons dark brown to black, occasionally with pale brown colouration extending from area surrounding lateral ocelli to posterior margin; ocelli pink; compound eyes brown; anteclypeus black; rostrum dark brown, extending to posterior margins of mid coxae; antennae dark brown.

Thorax: Pronotum brown with mottled dark brown to black colouration surrounding paramedian and lateral fissures and dorso-laterally anterior to pronotal collar; central fascia brown to olive brown, surrounded with black colouration, which broadens conspicuously towards anterior margin; pronotal collar mostly brown to pale brown, partially or extensively black anteriorly and on lateral angles; metanotum dark brown; mesonotum either brown or dark brown to black, typically with some brown colouration on lateral edges and between submedian and lateral sigilla; submedian and lateral sigilla dark brown to black; cruciform elevation and wing grooves pale brown, tending dark brown anteriorly; posterior third of mesonotum with dense fine and sparse long silver pubescence.

Wings: Fore wings hyaline; basal cells pale yellow-brown; pterostigmata brown; veins, including costal vein, brown, dark brown to black distally. Hind wing plagas white at base, grey medially; jugal folds white to grey, hyaline apically; veins brown throughout.

Legs: Coxae pale brown, tending dark brown on anterior inner, posterior outer and apical outer sides; meracantha spikes pale brown, dark brown basally, overlapping opercula; fore femora pale brown with broad

brown to dark brown longitudinal markings on outer anterior side, dark brown on posterior base and on inner anterior side; mid femora brown, darker on dorsal side, with pale brown apices; hind femora pale with narrow dark brown longitudinal markings on anterior and dorsal sides; fore tibiae brown to dark brown; mid tibiae pale brown with a narrow dark brown longitudinal marking on anterior side; hind tibiae pale brown; fore tarsi brown; mid and hind tarsi pale brown; pretarsi brown to dark brown; claws brown, darker apically.

Opercula (Fig. 1A): Broadly rounded; pale brown; plates undulating with medial areas conspicuously depressed.

Timbals (Fig. 2A): Anterior rib 5 vestigial, inconspicuous; rib 4 abbreviated, with a prominent isolated remnant extension ventrally; ribs 1 and 2 joined ventrally and fused dorsally to basal spur; anterior termination of basal spur fused with ribs 3–4, with rib unattached; prominent intercalary short ribs in medial areas between ribs 1 and 2, 2 and 3, and 3 and 4 (three in total).

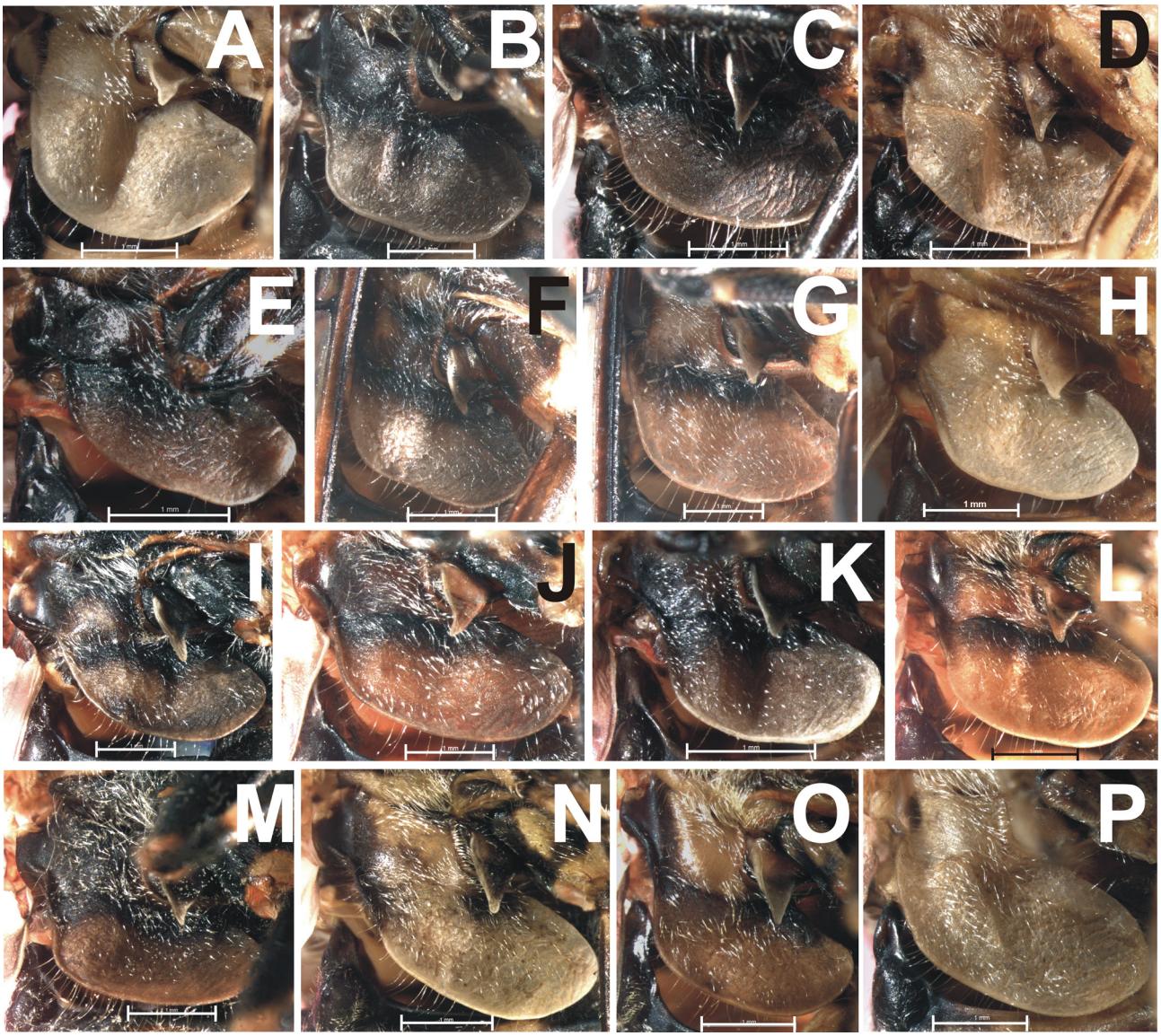

FIGURE 1. Photographs of male right opercula. (A) *Myopsalta albiventris* **n. sp.**, Mt Moffatt (25°12'S 148°59'E); (B) *M. bassiana* **n. sp.**, Acton (35°16'S 149°07'E); (C) *M. chrysopedia* **n. sp.**, Lake Douglas (30°52'S 121°24'E); (D) *M. crucifera* (Ashton), Plantation Creek, Ayr (19°32'S 147°30'E); (E) *M. gordoni* **n. sp.**, 82 km N. of St George (27°23'S 148°52'E); (F) *M. leona* **n. sp.**, Expedition Range NP (25°12'S 148°59'E); (G) *M. longicauda* **n. sp.**, Mt Moffatt (24°58'Sx148°00'E); (H) *M. mackinlayi* (Distant), Boonah Road turnoff west of Ipswich (27°40'S 152°44'E); (I) *Myopsalta majurae* **n. sp.**, Mt Majura–Mt Ainslie (34°15'S 149°11'E); (J) *M. melanobasis* **n. sp.**, 14.6 km W. of Drillham Creek (26°39'S 149°50'E); (K) *M. parvula* **n. sp.**, Acton (35°16'S 149°07'E); (L) *M. platyptera* **n. sp.**, Brigalow Research Station (24°49'S 149°45'E); (M) *M. riverina* **n. sp.**, 33 km SSW. of Rankins Springs (33°55'S 145°56'E); (N) *M. septa* **n. sp.**, Tannymorel (28°19'S 152°08'E); (O) *M. umbra* **n. sp.**, Hurdle Gully (24°55'Sx151°00'E); (P) *M. xerograsidia* **n. sp.**, Plantation Creek, Ayr (19°32'S 147°30'E). Scale bars = 1 mm.

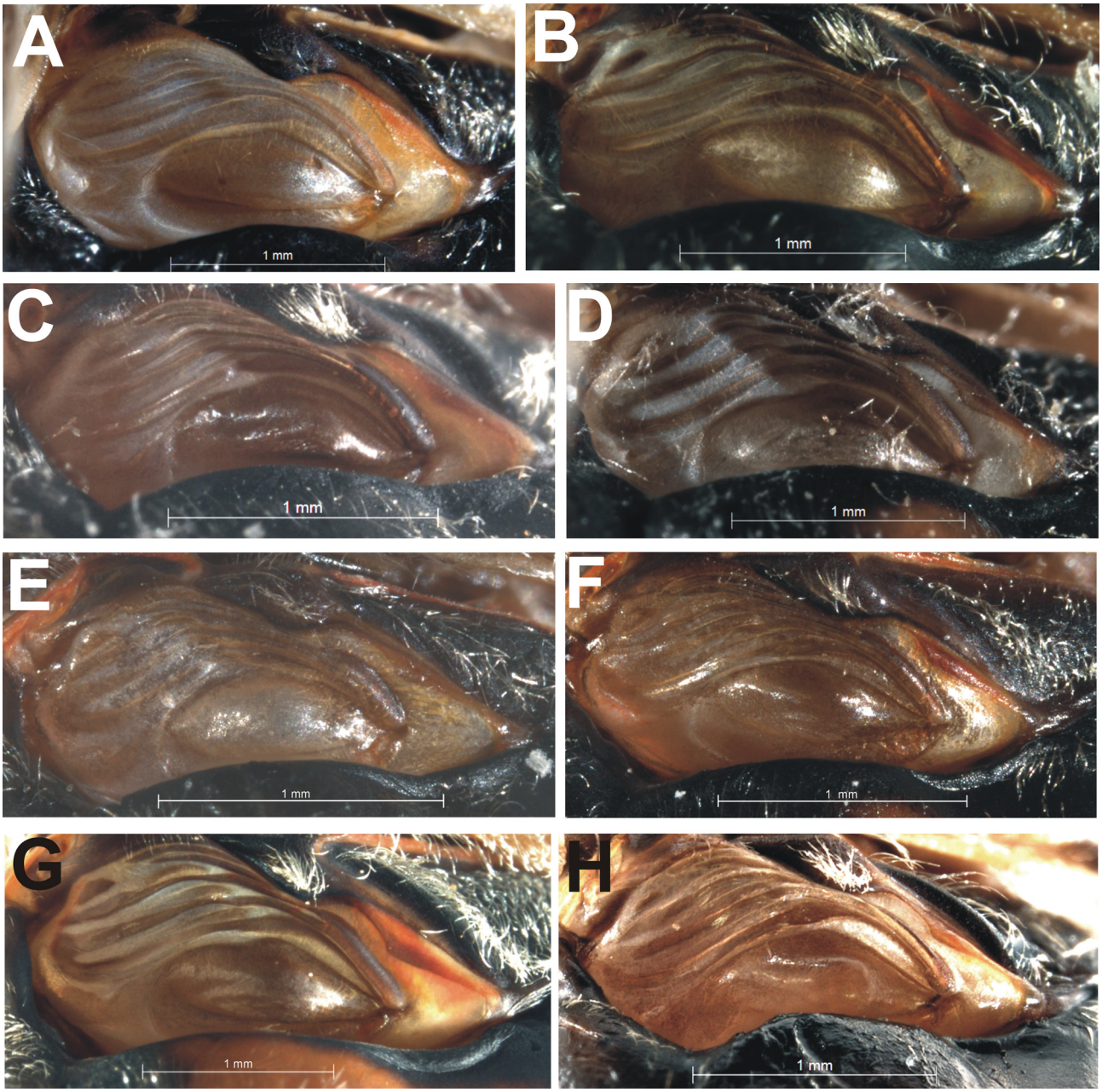

FIGURE 2. Photographs of male left timbals, with dorsal edge at right and posterior margin at bottom. (A) *Myopsalta albiventris* **n. sp.**, Mt Moffatt (25°12'S 148°59'E); (B) *M. bassiana* **n. sp.**, Acton (35°16'S 149°07'E); (C) *M. chrysopedia* **n. sp.**, Lake Douglas (30°52'S 121°24'E); (D) *M. crucifera* (Ashton), Woodgate (25°06'S 152°33'E); (E) *M. gordoni* **n. sp.**, 82 km N. of St George (27°23'S 148°52'E); (F) *M. leona* **n. sp.**, 4 km W. of Binjour (25°32'S 151°26'E); (G) *M. longicauda* **n. sp.**, Expedition Range (24°38'Sx149°00'E); (H) *M. mackinlayi* (Distant), Boomer Range (23°12'S 149°45'E).

Abdomen: Tergite 1 dark brown; tergite 2 wider along dorsal midline than tergites 3 to 7; tergite 2 dark brown to black, with brown areas on posterior dorso-lateral sides, or brown with a dark brown marking centrally, expanding posteriorly; tergites 3 to 7 either dark brown with brown areas on posterior margins (widest in dorso-lateral and lateral areas), or brown with dark brown markings centrally, each receding posteriorly; tergite 8 brown, with a dark brown marking anteriorly and centrally, narrowing posteriorly; tergites 2 to 8 with dense short silver pubescence on dorso-lateral sides and with extensive long and short silver pubescence on lateral sides; intersegmental membranes pale yellow-brown; epipleurites pale brown; sternite II pale brown; sternites III to VI pale brown, sometimes each with a dark brown spot medially to varying extents with brown areas medially; sternites VII and VIII pale brown; anterior sternites visible in lateral view.

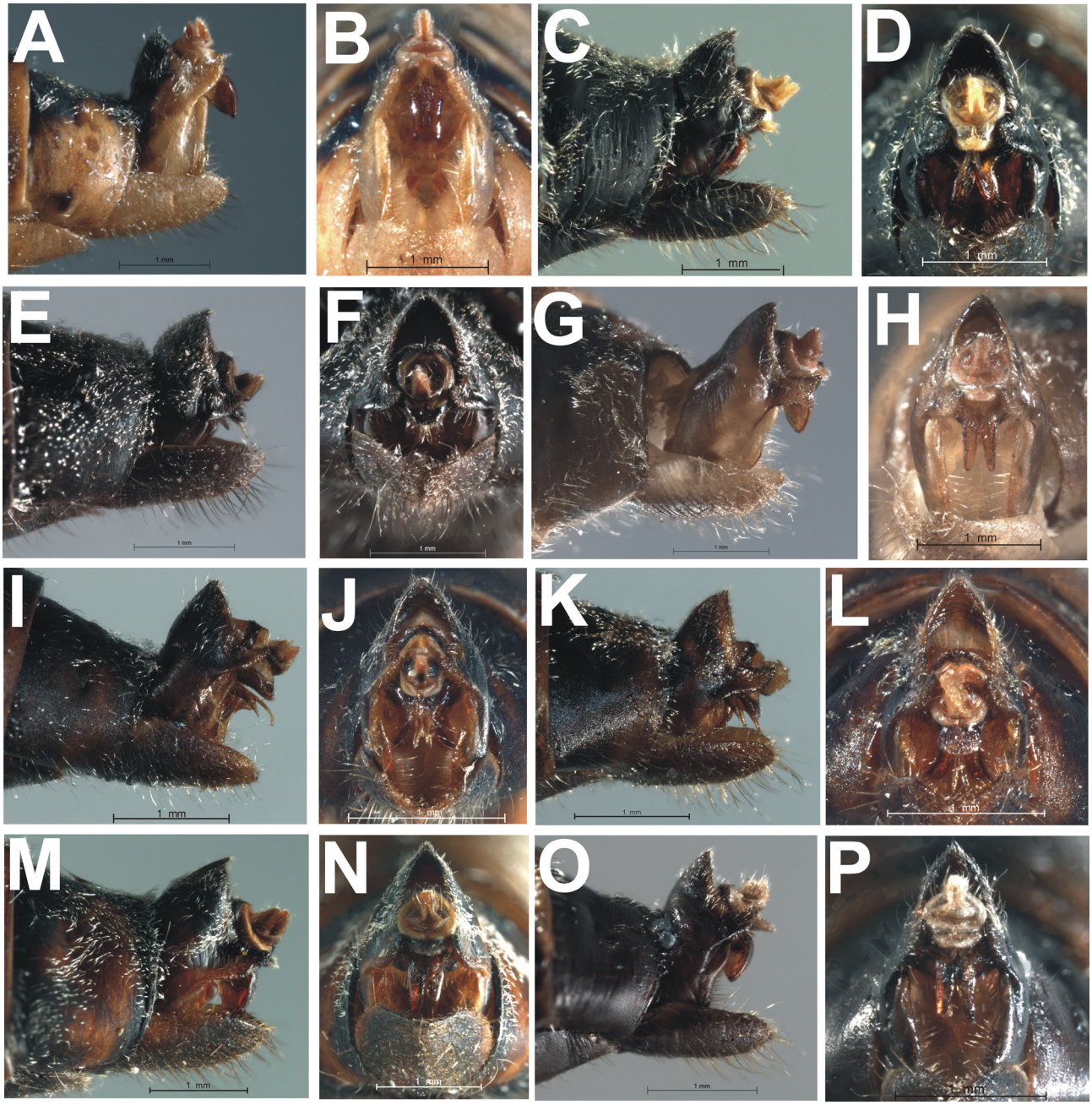

FIGURE 3. Photographs of male pygofer, viewed laterally from left and ventrally. *Myopsalta albiventris* **n. sp.**, Mt Moffatt (25°12'S 148°59'E), (A) lateral, (B) ventral; *M. bassiana* **n. sp.**, Acton (35°16'S 149°07'E), (C) lateral, (D) ventral; *M. chrysopedia* **n. sp.**, Kalgoorlie (30°45'S 121°28'E), (E) lateral, (F) ventral; *M. crucifera* (Ashton), Woodgate (25°06'S 152°33'E), (G) lateral, (H) ventral; *M. gordoni* **n. sp.**, 82 km N. of St George (27°23'S 148°52'E), (I) lateral, (J) ventral; *M. leona* **n. sp.**, 4 km W. of Binjour (25°32'S 151°26'E), (K) lateral, (L) ventral; *M. longicauda* **n. sp.**, Expedition Range (24°38'Sx149°00'E), (M) lateral, (N) ventral; *M. mackinlayi* (Distant), Boomer Range (23°12'S 149°45'E), (O) lateral, (P) ventral.

Genitalia (Figs 3A, B): Pygofer brown to pale brown, dark brown anteriorly; upper lobes in ventral view with terminals directed dorsally and slightly inwards, apically acute; basal lobes in lateral and ventral view slightly curved, apically rounded; median lobe of uncus relatively narrow, rounded; claspers in ventral view conspicuous, diverging gradually from point of downward deflection, with sharply developed apices; pseudoparameres projecting further (ventrally) than endotheca and ventral support; ventral support acute, projecting slightly beyond endotheca; endotheca fleshy.

Female (Plate 1C): Head, wings and legs match description of male.

Thorax: Pronotum brown to pale brown; central fascia pale brown, surrounded with black colouration, which

broadens towards anterior pronotal margin; pronotal collar mostly brown to pale brown, tending dark brown on anterior margin, including lateral angles; metanotum dark brown; mesonotum brown to pale brown; submedian sigilla dark brown to black; lateral sigilla pale brown to dark brown, typically with diffuse brown to pale brown areas; cruciform elevation and wing grooves pale brown; scutal depressions black; posterior third of mesonotum with dense fine and sparse long silver pubescence.

Abdomen: Tergite 1 brown to dark brown; tergites 2 to 8 pale brown to brown, with dark brown to black areas medially and sometimes laterally, narrowing towards posterior margin; auditory capsules dark brown to black; abdominal segment 9 pale brown to brown, with dark brown dorso-lateral longitudinal markings; dorsal beak dark brown, sharply defined; epipleurites brown to pale brown; sternites II to VII pale brown; ovipositor sheath extends approximately 1.9–2.6 mm beyond termination of abdominal segment 9.

Measurements. N=15♂ 3♀. Ranges and means (in parentheses), mm; BL: ♂ 12.6–14.5 (13.7); ♀ 15.8–17.9 (17.1). FWL: ♂ 14.2–17.7 (16.1); ♀ 17.0–17.5 (17.2). HW: ♂ 3.6–4.1 (3.9); ♀ 4.1–4.2 (4.2). PW: ♂ 3.6–4.3 (4.0); ♀ 4.1–4.3 (4.2). AW: ♂ 3.8–4.7 (4.4); ♀ 4.3–4.4 (4.3). FWL/W: ♂ 2.36–2.95 (2.72); ♀ 2.78–2.92 (2.83); OL: 7.1–8.6 (7.97).

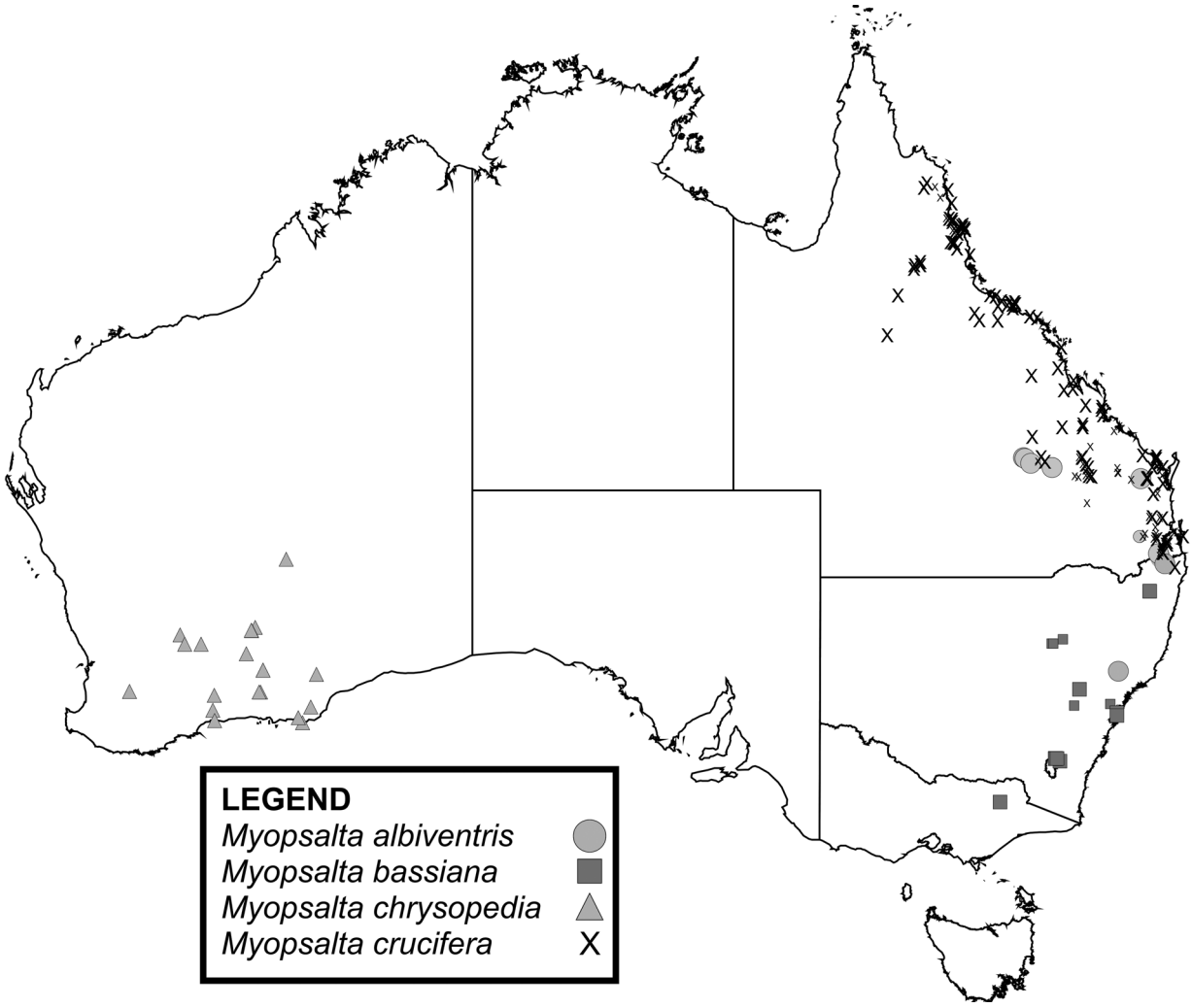

FIGURE 4. Map of Australia showing the geographical distributions of *Myopsalta albiventris* **n. sp.** in Queensland and New South Wales, *M. bassiana* **n. sp.** in the Australian Capital Territory, New South Wales and Victoria, *M. chrysopedia* **n. sp.** in Western Australia, and *M. crucifera* (Ashton) in Queensland and New South Wales. Large symbols represent specimen records and smaller symbols denote audio recordings or aural observations.

Morphological distinguishing features. *Myopsalta albiventris* **n. sp.** can be distinguished from *M. atrata*, *M. binotata*, *M. coolahensis*, *M. gordoni* **n. sp.**, *M. lactea*, *M. libritor*, *M. waterhousei* and *M. xerograsidia* **n. sp.** by the colour of the basal membranes of the fore wings, which is pale brown or pale orange rather than white to pale grey. It can be distinguished from *M. bassiana* **n. sp.**, *M. chrysopedia* **n. sp.**, *M. crucifera*, *M. leona* **n. sp.**, *M.*

longicauda **n. sp.**, *M. mackinlayi*, *M. majurae* **n. sp.**, *M. melanobasis* **n. sp.**, *M. parvula* **n. sp.**, *M. platyptera* **n. sp.**, *M. riverina* **n. sp.**, M. *septa* **n. sp.** and *M. umbra* **n. sp.** by the colouration of the sternites, which is almost entirely pale brown and not predominantly black, dark brown or brown medially. Both sexes can be separated from *M. wollomombii* by the colour of the mesonotum, which (apart from the submedian and lateral sigilla) is brown rather than black.

Distribution, habitat and behaviour (Fig. 4). *Myopsalta albiventris* has a discontinuous distribution in Queensland and New South Wales. In Queensland, it occurs from Carnarvon National Park, Expedition Range National Park and the Biggenden district south-east to Maroon Dam and Mt Lindesay on the Queensland/ New South Wales border. In New South Wales, it is recorded from the Kyogle district and from 48 km north of Singleton in the Hunter Valley. Populations occur in grassy woodland and on road verges where the adults are typically found in grass. Adults may be present from September to February. Males sing during warm, sunny weather.

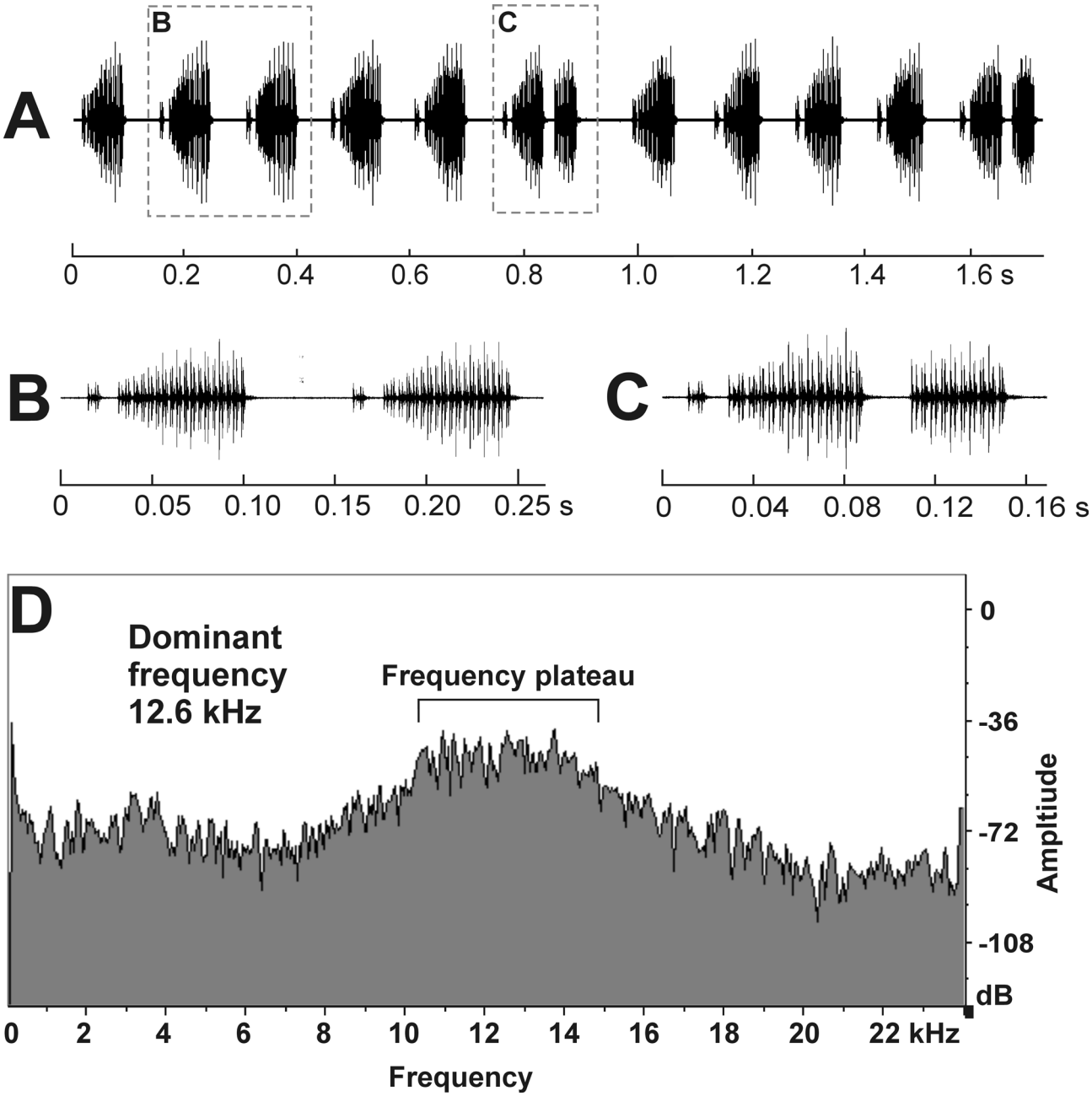

FIGURE 5. Male calling song structure of *Myopsalta albiventris* **n. sp.** from a recording obtained at Mt Moffatt (25°12'S 148°59'E) by the author using RS1 (see Methods). (A) Wave plot of two complete phrases, each containing four or five single macrosyllables and ending with a double macrosyllable. (B) Expanded wave plot showing two single macrosyllables (each preceded by a soft syllable). (C) Expanded wave plot showing the structure of the double macrosyllable that concludes each song phrase. (D) Spectrogram showing the highest amplitude frequency plateau and dominant frequency.

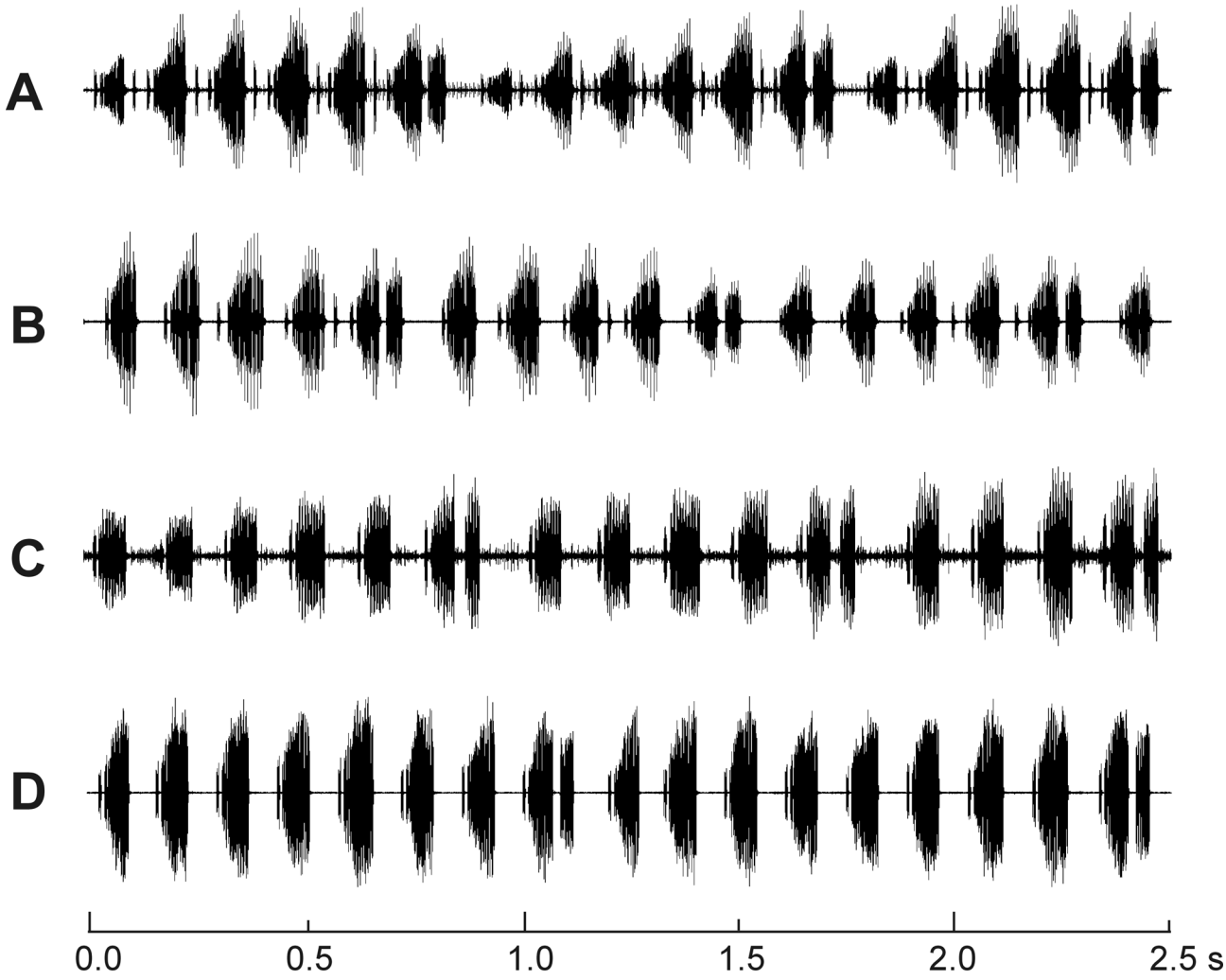

FIGURE 6. Wave plots illustrating the calling song of *Myopsalta albiventris* **n. sp.** from four different locations, including (A) Maroon Dam (28°10'S 152°39'E), (B) Mt Moffatt (24°52'S 148°01'E), (C) Carnarvon Gorge (25°04'S 148°15'E), and (D) Robinson Gorge (25°13'S 148°59'E). Recordings were obtained by the author using RS2 (A) and RS1 (B), and by A. Ewart using RS3 (C, D) (see Methods).

Calling song (Figs 5, 6). The calling song contains a set of continuously repeated phrases of variable duration. Each phrase contains 2–10 (typically 3 or 4) single macrosyllables, each 0.054–0.080 s duration and separated by gaps of 0.048–0.093 s duration (all statistics, n=10 recordings). The gaps are typically punctuated by 1 or 2 syllables, which occur immediately before production of the next macrosyllable. Sometimes the first macrosyllable of each phrase is also preceded by 1–2 syllables. Each phrase ends with a double macrosyllable. This is composed of an initial macrosyllable of 0.050–0.066 s duration, a gap of 0.015–0.025 s duration, and a second shorter macrosyllable of 0.029–0.045 s duration. A gap of 0.084–0.123 s duration separates each phrase. It is anticipated that females respond during the gap following the short macrosyllable at the end of each phrase, although there are presently no observations to support this expectation (see Marshall and Hill (2009) for an explanation on female response to male calling songs in the tribe Cicadettini).

This species calls during the day and is not known to sing at dusk. The calling song maintains an even frequency distribution throughout, with a high amplitude plateau of 10.4–15.2 kHz and a dominant frequency between 11.0 and 14.2 kHz.

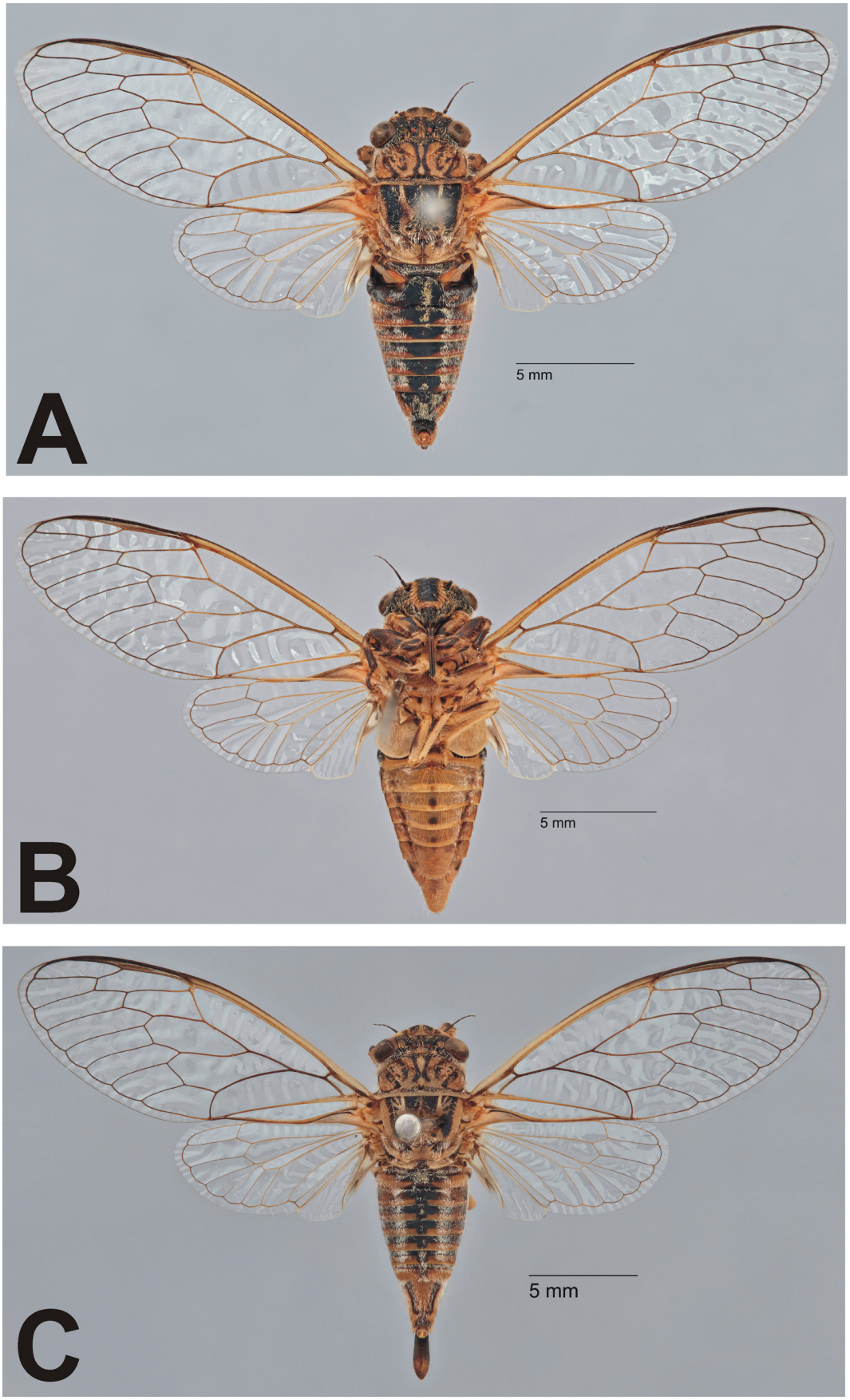

PLATE 1. *Myopsalta albiventris* **n. sp.**: (A) male holotype, Expedition Range (24°38'Sx149°00'E), dorsal view; (B) male holotype, ventral view; (C) female paratype, Mt Moffatt (24°55'S 148°03'E), dorsal view.

***Myopsalta bassiana* n. sp.**
(Figs 1B, 2B, 3C, 3D, 4, 7, 8; Plate 2)

Notopsalta sp. nr *atrata* Montane Grass Buzzer: Moss & Popple, 2000: 54, 57.
Notopsalta sp. nr *atrata*: Williams, 2002: 156, 157.
Notopsalta sp. nr *atrata*: Emery *et al.*, 2005: 98, 105, 107, Fig. 2, Tables 1–3.
Myopsalta sp. nr *atrata* Montane Grass Buzzer (Moss & Popple, 2000): Sanborn, 2014: 582, 583.
Myopsalta sp. nr *atrata* (Emery *et al.*, 2005): Sanborn, 2014: 583.

Types. **Holotype**: Male# AUSTRALIA ACT, Frith St, Acton, 18.xi.2010, LT2009371, L.W. Popple, 35°16'14"Sx149°06'48"E, 286-0014, ANIC Database No. 20-014379 (**ANIC**); **Paratypes**: AUSTRALIAN CAPITAL TERRITORY: 1♀ same data as holotype, 18.xi.2010, 286-0019, ANIC Database No. 20-014380 (**ANIC**); 1♀ same data as holotype, 286-0016; 1♂ same data as holotype, 18.xi.2010, 286-0017 (**QM**); 2♂ Mt Ainslie, 20.xii.2001, D. Emery; 1♂ same data as previous 12.xii.2001; 1♂ same data as previous, 1.i.2002; 1♂ same data as previous, 20.xi.2003, N. & D. Emery (**DE**); 1♂ ANBG perimeter fence, Acton, 35°16'26"S 149°06'39"E, 25.xi.2009, L.W. Popple, LT2009371, 286-0006; 2♂ same data as holotype, 3.xii.2009, 286-007 & 286-0008; 2♂ same data as holotype, 5.xii.2009, 286-0009 & 286-0010; 1♂ same data as holotype, 22.xi.2010, 296-0013; 1♂ same data as holotype, 286-0015; 1♂ same data as holotype, 6.xii.2010, 286-0018 (**LWP**); NEW SOUTH WALES: 4♂ Kinka Reserve, Terrey Hills, 17.xii.1998, N. Emery; 1♂ same data as previous, 14.xii.2008; 2♂ same data as previous, 5.xii.1999, D. Emery; 1♂ same data as previous, 2.i.2007, D. & C. Emery; 2♂ same data as previous, 14.xii.1997, N. Emery; 3♂ same data as previous, 8.i.2002, S. & D. Emery; 1♂ same data as previous, 9.i.2000, N. & D. Emery (**DE**); 4♂ Raspberry Lookout, Gibraltar Range National Park via Glen Innes, 19–24.i.2000, J. Moss & L. Popple, 286-0001 to 286-0004; 1♂ Kinka Reserve, Terrey Hills NSW, 17.xii.1998, N. Emery; 1♂ Cuumbean Nature Reserve, 35°21'34"S 149°15'59"E, 5.xii.2009, L. Popple, S12588, 286-0011 (**LWP**); 1♂ Manly, Bantry Bay, 18.xii.1983, V.R. Bejsak, on flowers *Angophora hispida* (**MSM**); VICTORIA: 5♂ AU.VI.ALP, 7.9 km SE. of Mt Beauty, 20.2km N. of Omeo, 36°45.896'S 147°12.761'E, 577 m, 04.i.2011, K. Hill, D. Marshall, C. Simon Lab Voucher, 11.AU.ALP, 'Notopsalta alpine 2', song heard; 1♂ same data as previous, 11.AU.ALP.01, 'Notopsalta alpine 2', specimen recorded; 1♂ same data as previous, 11.AU.ALP.02, 'Notopsalta alpine 2', specimen recorded (**MSM**).

Etymology. The name *bassiana* (Latin adjective, feminine) reflects the temperate or bassian distribution of this species in south-eastern Australia.

Description. Male. (1B, 2B, 3C, 3D; Plates 2A, 2B).

Head: Postclypeus predominantly black, pale brown along lateral margins and with a pale brown area medially on dorsal side, narrowing anteriorly; supra-antennal plates and genae black; mandibular plates black, brown along lateral margins, covered by silvery pubescence; vertex and frons black with sparse silvery pubescence; small pale brown diamond-shaped area extending narrowly along epicranial suture from near median ocellus to pronotal collar margin; ocelli pale red; compound eyes brown; anteclypeus black; rostrum dark brown, darker apically, clearly extending beyond anterior margins of hind coxae; antennae dark brown to black.

Thorax: Pronotum brown; central fascia conspicuous, pale brown, surrounded with black colouration, which broadens along anterior and posterior pronotal margins; with irregular black patches near paramedian and lateral fissures, and narrow black areas along lateral margins; pronotal collar mostly dark brown to black, with brown dorso-lateral posterior margins; metanotum dark brown to black; mesonotum including submedian and lateral sigilla, black, with brown areas between the submedian and lateral sigilla extending on to arms and lateral sides of cruciform elevation and posterior half of wing grooves; posterior third of mesonotum with dense fine and sparse long silver pubescence.

Wings: Fore wings hyaline; basal membranes orange to pale orange-brown; pterostigmata orange to reddish-brown; veins, including costal vein, brown to dark brown, darker distally. Hind wing plagas white at base, grading to dark grey-brown along basal two thirds, this colour extending broadly along jugal folds and terminating before apices, hyaline over remainder; veins pale brown basally, brown medially, dark brown on distal third.

Legs: Fore coxae dark brown, with longitudinal brown areas on medial anterior and posterior sides, pale brown mixed with pale red at apices; mid and hind coxae dark brown, with pale red joints, pale brown mixed with pale red at apices; meracantha spikes dark brown, becoming pale brown apically, overlapping opercula; fore femora dark brown with pale brown longitudinal areas on outer anterior sides, pale brown at apices; mid femora dark brown

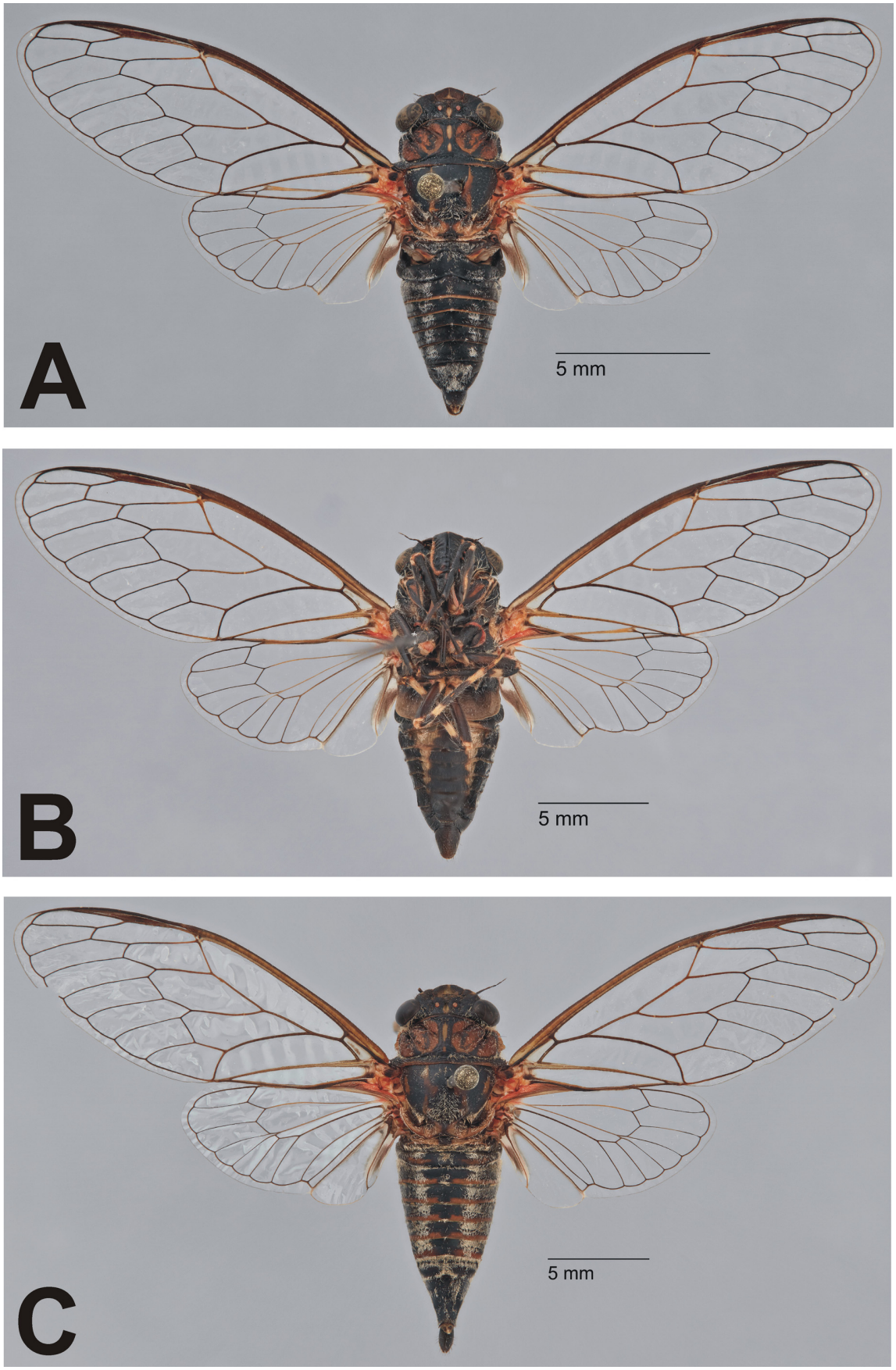

PLATE 2. *Myopsalta bassiana* **n. sp.**: (A) male holotype, Acton (35°16'S 149°07'E) dorsal view; (B) male holotype, ventral view; (C) female paratype, same locality as holotype, dorsal view.

with pale brown apices; hind femora dark brown to brown with pale brown bases and apices; fore tibiae dark brown; mid tibiae dark brown, each with a pale brown band above base; hind tibiae dark brown, each with two pale brown bands, one above base, other towards apex; fore and mid tarsi dark brown; hind tarsi brown; pretarsi brown with dark brown apical areas; claws dark brown.

Opercula (Fig. 1B): Broadly rounded; dark brown to black over basal half, dark brown to brown at crest; plates undulating, each with two ridges, basal ridges sharply defined, apical ridges gradual, medial areas between ridges depressed.

Timbals (Fig. 2B): Anterior rib 5 abbreviated; rib 4 also abbreviated, with a prominent isolated remnant extension ventrally; ribs 1 and 2 joined ventrally and fused dorsally to basal spur; anterior termination of basal spur fused with ribs 3–4, with rib 5 unattached; prominent intercalary short ribs in medial areas between ribs 1 and 2, 2 and 3, and 3 and 4 (three in total).

Abdomen: Tergite 1 black; tergite 2 wider along dorsal midline than tergites 3 to 7; tergites 2 to 7 black, sometimes with brown areas on dorso-lateral posterior margins, all with dense short silver pubescence on dorso-lateral sides and with extensive long and short silver pubescence on lateral sides; tergite 8 black, covered in short silver pubescence; intersegmental membranes pale brown; epipleurites black, with sparse silver pubescence; sternite II black medially and laterally, pale brown ventro-laterally, with a dark brown area medially, which broadens posteriorly, or in some specimens entirely pale brown; sternites III to VI pale brown laterally, with dark brown areas medially, which broaden posteriorly, gradually increasing in size distally in each successive sternite; sternite VII dark brown to black with diffuse pale brown areas at extreme anterio-lateral margins; sternite VIII dark brown to black; anterior sternites visible in lateral view.

Genitalia (Figs 3C, D): Pygofer dark brown; upper lobes in ventral view relatively flat, with terminals directed slightly inwards and tapering broadly; basal lobes in ventral and lateral views slightly curved, apically flat; median lobe of uncus fairly blunt, exhibiting limited protrusion; claspers in ventral view conspicuous, diverging from point of downward deflection, with relatively broad apices; pseudoparameres projecting further (ventrally) than endotheca and ventral support; ventral support acute, projecting slightly beyond endotheca; endotheca fleshy.

Female (Plate 2C): Head, thorax, wings and legs match description of male.

Abdomen: Tergite 1 black; tergites 2 to 7 black, with broad brown areas on posterior dorso-lateral to submedial sides, being less extensive on tergite 2; tergite 8 black; auditory capsules black; abdominal segment 9 black on dorsal and lateral sides, pale olive-brown ventrally; dorsal beak black, sharply defined; sternite II black laterally and medially, otherwise pale to medium brown; epipleurites black, pale brown along posterior margins; sternites III to VI pale brown with broad black areas medially, broadening posteriorly, typically similar in width, though often widest on sternite IV; sternite VII pale brown with short, oblique, darker longitudinal markings medially; ovipositor sheath extends approximately 1.0 mm beyond termination of abdominal segment 9.

Measurements. N=15♂ 3♀. Ranges and means (in parentheses), mm; BL: ♂ 12.7–15.9 (14.64); ♀ 17.8–19.1 (18.43). FWL: ♂ 13.8–19.2 (17.46); ♀ 19.1–20.9 (20.13). HW: ♂ 3.8–4.9 (4.52); ♀ 4.8–5.1 (4.97). PW: ♂ 3.7–5.0 (4.56); ♀ 5.0–5.5 (5.30). AW: ♂ 4.2–5.3 (4.86); ♀ 4.9–5.6 (5.27). FWL/W: ♂ 2.35–2.87 (2.62); ♀ 2.73–2.86 (2.78); OL: 6.7–6.9 (6.77).

Morphological distinguishing features. *Myopsalta bassiana* **n. sp.** can be distinguished from *M. atrata*, *M. binotata*, *M. coolahensis*, *M. gordoni* **n. sp.**, *M. lactea*, *M. libritor*, *M. waterhousei* and *M. xerograsidia* **n. sp.** by the colour of the basal membranes of the fore wings, which is pale brown or pale orange rather than white to pale grey. It can be distinguished from *M. melanobasis* **n. sp.** and *M. platyptera* **n. sp.** by the appearance of the fore wing clavus, which is entirely hyaline and not opaque at the base. Males and females can be separated from *M. albiventris* **n. sp.** and *M. wollomombii* by the colouration of the sternites, which is predominantly dark brown (cf. almost entirely pale brown). They can be differentiated from *M. umbra* **n. sp.** by the colour of the costal veins, which is brown rather than reddish-brown. Males can be distinguished from *M. septa* **n. sp.** and *M. crucifera* by the colouration of sternite VII, which is entirely dark brown to black (not bordered with pale brown on any margin). They can be distinguished from *M. parvula* **n. sp.** by having contrasting pale brown lateral edges on sternite III (cf. almost entirely dark brown to black), and from *M. leona* **n. sp.** and *M. chrysopedia* **n. sp.** by having a fore wing length/width ratio of <2.7. They can be separated from the closely similar *M. mackinlayi* and *M. riverina* **n. sp.** by the colouration of the opercula, which is dark brown to black rather than predominantly pale brown. They can be distinguished from the closely similar *M. longicauda* **n. sp.** in having uniform pale brown colouration on the lateral sides of sternites II–V (not a mixture of reddish-brown and pale brown). In addition, they can be separated from *M.*

majurae **n. sp.** by the presence of contrasting pale brown colouration on the ventro-lateral sides of sternite II. Females can be distinguished from *M. chrysopedia* **n. sp.**, *M. crucifera*, *M. leona* **n. sp.**, *M. longicauda* **n. sp.**, *M. parvula* **n. sp.** and *M. septa* **n. sp.** by the length of the ovipositor sheath, which extends approximately 1.0 mm beyond the apex of abdominal segment 9 (cf. 0.5 mm in *M. parvula* and ≥2 mm in the other species). They are not able to be reliably differentiated from the closely similar *M. mackinlayi* and possibly also *M. majurae* **n. sp.** or *M. riverina* **n. sp.** for which the females are currently unknown (male specimens are required).

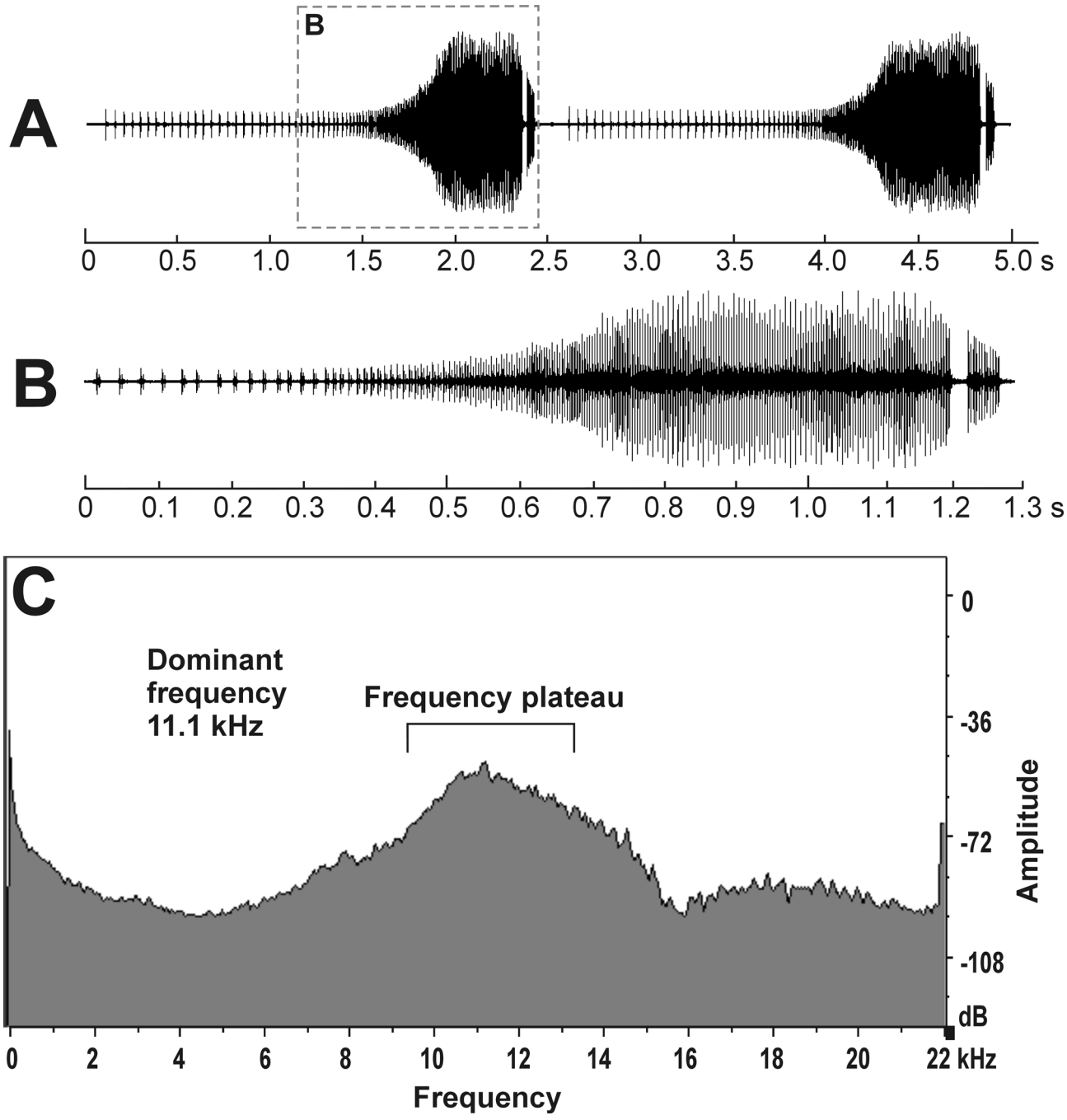

FIGURE 7. Male calling song structure of *Myopsalta bassiana* **n. sp.** from a recording obtained at Acton (35°16'S 149°07'E) by the author using RS5 (see Methods). (A) Wave plot of two complete phrases, each containing a sequence of discrete syllables that condenses into a long echeme, which builds in amplitude before ending abruptly and being followed by a short echeme or macrosyllable. (B) Expanded wave plot showing the structure of the latter half of a phrase, including the conspicuous amplitude modulation of the long echeme and the short echeme that follows. (C) Spectrogram showing the highest amplitude frequency plateau and dominant frequency.

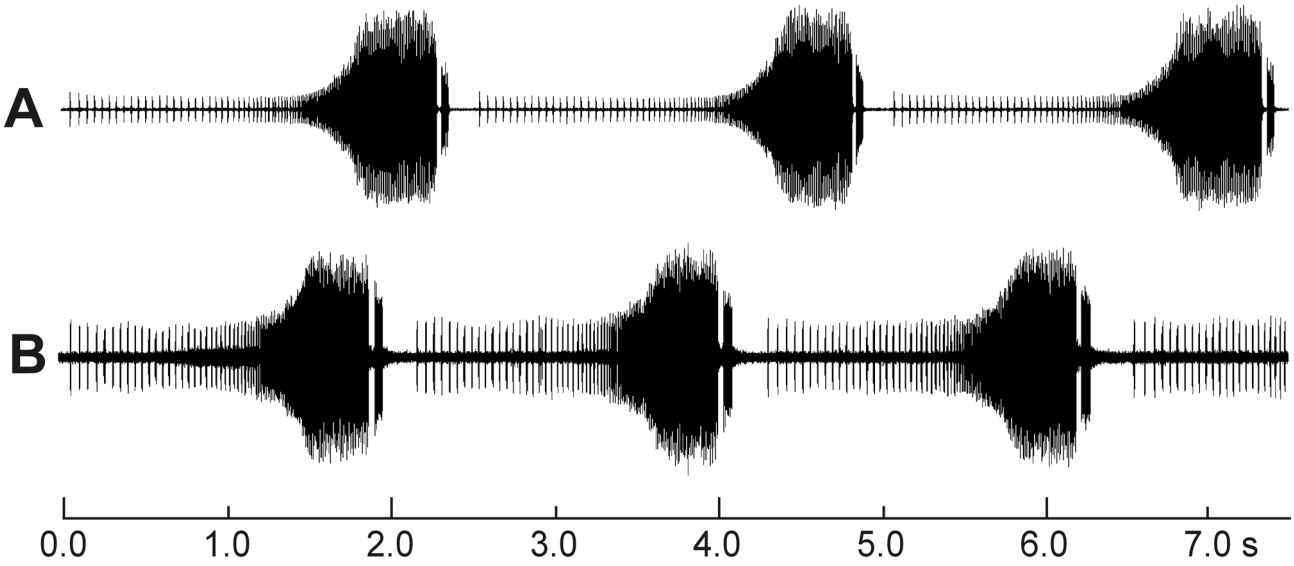

FIGURE 8. Wave plots comparing the structure of the calling song of *Myopsalta bassiana* **n. sp.** from two different locations, namely (A) Acton (35°16'S 149°07'E), and (B) Clandulla (32°53'S 149°56'E). Both recordings were obtained by the author using RS5 (see Methods).

Distribution, habitat and behaviour (Fig. 4). *Myopsalta bassiana* is found in south-eastern Australia from Gibraltar Range west of Grafton in northern New South Wales, Pilliga Nature Reserve and Warrumbungle National Park on the central western slopes, the Capertee Valley and Blue Mountains and northern parts of Greater Sydney in central New South Wales, south through the Australian Capital Territory to near Omeo in northern Victoria. Populations occur in grassy woodland and open forest with a sparse to mid-dense shrubby understorey where the adults are typically found on grass and in shrubs. Adults have been found from October to January. Males call during warm conditions.

Calling song (Figs 7, 8). The calling song contains a set of repeated phrases. At the onset of calling, each phrase begins with a long echeme (0.646–1.702 s duration), followed by a 0.023–0.045 s gap, a short echeme or macrosyllable (0.02–0.097 s duration) and a 0.196–1.767 s gap (all statistics, *n*=8 recordings). Close inspection of the beginning of the long echemes in each phrase reveals a series of discrete syllables that coalesce and increase up to 3x in amplitude during production of the echeme. After production of several successive echemes, males typically start to lengthen the introduction of each phrase with the addition of a long sequence of syllables (each 0.005–0.013 s duration), separated by gaps of 0.042–0.092 s duration. The gaps between these syllables noticeably decrease towards the end of a sequence, shortening down to 0.011 s immediately prior the production of the long echeme. These introductory sequences range in duration between 1.204 and 2.277 s, with the longest examples shortening the gap at the end of the preceding phrase down to 0.030 s on occasion. Field observations indicate that the female responds during the gap following the short echeme or macrosyllable at the end of each phrase.

This species calls during the day and is not known to sing at dusk. The calling song maintains an even frequency distribution throughout, with a high amplitude plateau of 9.7–13.2 kHz and a dominant frequency between 10.2 and 12.0 kHz.

***Myopsalta chrysopedia* n. sp.**
(Figs 1C, 2C, 3E, 3F, 4; Plate 3)

Types. **Holotype**: ♂ Kalgoorlie, W.A., 13 Jan. 1989, M.S. & B.J. Moulds **(WAM)**; **Paratypes**: WESTERN AUSTRALIA: 1♀ Lake Douglas, 12 km SW. of Kalgoorlie, 6.x.1988, A.J. Graham (**WAM**); 5♂ 2♀ N. of Cave Rock Camp, 28.6 km S. of Burra Rock, 31.640°S 121.209°E, 17.xi.2007, 380 m, D.R. Britton, D.J. Bickel, Britton 2007013 (at light), K435588–K435594; 5♂ 3♀ Frank Hann Nat. Pk, Lillian Stoke Rock, 400 m, 33°04.064'S, 120°05.827'E, 5.xi.1996, Schuh and Cassis (96-66), K435580–K435587 (**AM**); 1♂ 3♀ 3km NE. of Salmon Gums

WA, 32.58°S 121.39°E, 10.i.1993, Edwards & Nielsen, [♂] 005611, BOLD Proc. ID 786-11; 1♀ Deeba Rockhole via Laverton, 12.xi.1977, Upton & Feehan; 8♂ 2♀ 3miles S. by W. of Mt Ragged, 12.xi.1969, Upton; 1♀ Thomas R., 23km NW by W of Mt Arid, 33.51°S 123.00°E, 4–7.xi.1977, Upton & Feehan (**ANIC**); 1♂ Lake Douglas, 12 km SW. of Kalgoorlie, 13.xi.1986, A.J. Graham; 1♀ same data as previous, 1.xi.1986 (**QM**); 1♀ 6 mi NE. of Ravensthorpe, 25.xi.1968, N. McFarland; 1♀ Kalgoorlie, 30.xi.1960, P. Aitken (**SAM**); 1♂ Kalgoorlie, 29.xi.1985, M.S. & B.J. Moulds; 1♀ Kalgoorlie, 1.xii.1985, M.S. & B.J. Moulds; 1♂ 2♀ Kalgoorlie, 13.i.1989, M.S. & B.J. Moulds; 1♀ Kalgoorlie, 4.ii.1988, A. J. Graham; 2♂ 2♀ 53 km E. of Norseman, 27.x.2005, P. Hutchinson; 1♂ Ravensthorpe, 6.xi.1983, K. and E. Carnaby; 1♀ Narrogin, 4.xii.1985, M.S. & B.J. Moulds; 1♂ 1♀ Cape Arid, 31.x.1983, K. and E. Carnaby; 1♂ Kalgoorlie, 12.xii.1988, A.J. Graham; 1♀ [ovipositor damaged], Kalgoorlie, 23.xi.1986, A.J. Graham; 1♂ Baladjie N.R., 22.ix.1991, M.R. Williams, W8; 4♂ 3♀ Lake Douglas, 12 km SW. of Kalgoorlie, 13.xi.1986, A.J. Graham; 1♂ same data as previous, 17.i.1989; 1♀ Norseman, 6.x.1988, H. & A. Howden; 1♀ Lake Douglas, 12 km SW. of Kalgoorlie, 13.i.1989, M.S. & B.J. Moulds; 1♂ Balladonia, 17.xi.1988, H. & A. Howden; 1♂ 5 km W. of Moorine Rock nr Southern Cross, 2.xii.1985, M.S. & B.J. Moulds; 6♂ 2♀ 8 km E. of Salmon Gums, 32°58'S 121°42'E, 5.i.1987, mv lamp, G. and A. Daniels; 1♀ Yellowdine, 26.x.1984, at light, K. & E. Carnaby; 1♀ Hopetoun, 26.xii.1984, K. & E. Carnaby (**MSM**).

Etymology. A Latinised compound, feminine adjective composed of the Greek words *Chrysos*, meaning 'gold', and *pedia*, meaning 'of the feet', referring to the Goldfield's region of Western Australia, where a large proportion of the material of this species has been collected.

Description. Male. (Figs 1C, 2C, 3E, 3F; Plates 3A, 3B).

Head: Postclypeus predominantly black, ventral margins reddish-brown, with a pale brown area medially on dorsal side, narrowing anteriorly; supra-antennal plates and genae black; mandibular plates black, dark brown along lateral margins, covered by silvery pubescence; vertex and frons black with sparse silvery pubescence, and with a small pale brown wedge-shaped area extending narrowly along epicranial suture from near median ocellus to pronotal collar margin; ocelli pale red; compound eyes brown; anteclypeus black; rostrum dark brown, extending to anterior margins of hind coxae; antennae dark brown to black.

Thorax: Pronotum brown with prominent; central fascia dull yellow-brown, surrounded with black colouration, which broadens conspicuously along anterior and posterior pronotal margins and extends irregularly along paramedian and lateral fissures, and along lateral margins; pronotal collar mostly black, dark brown along posterior margins; metanotum dark brown to black; mesonotum including submedian and lateral sigilla, black, with brown to dark brown areas on lateral sides of cruciform elevation, on posterior margins of wing grooves, and sometimes in narrow areas anteriorly between submedian and lateral sigilla; posterior third of mesonotum with dense fine and sparse long silver pubescence.

Wings: Fore wings hyaline; basal membranes pale grey to pale orange-brown; pterostigmata brown; veins, including costal vein, pale brown to dark brown, darkest distally. Hind wing plagas white at base, grading to pale grey, this colour extending broadly along jugal folds and terminating before apices, hyaline over apical quarter; veins pale brown basally, brown medially, dark brown on distal third.

Legs: Coxae black with dark brown edges and pale brown apices; meracantha spikes pale brown, black basally, overlapping opercula; fore femora black with narrow, dark brown longitudinal areas on outer anterior sides, pale brown at apices; mid femora black with pale brown apices; hind femora dark brown with pale brown apices; fore tibiae black; mid tibiae dark, each with a pale brown band above base and also near apex; hind tibiae pale brown, darker medially; fore and mid tarsi dark brown; hind tarsi brown; pretarsi brown with dark brown apical areas; claws dark brown.

Opercula (Fig. 1C): Broadly rounded; principally black, grading to dark brown at crest; plates undulating, each with with a single sharply defined fold medially.

Timbals (Fig. 2C): Anterior rib 5 abbreviated; rib 4 also abbreviated, with a prominent isolated remnant extension ventrally; ribs 1 and 2 joined ventrally and fused dorsally to basal spur; anterior termination of basal spur fused with ribs 3–4, with rib 5 unattached; prominent intercalary short ribs in medial areas between ribs 1 and 2, 2 and 3, and 3 and 4 (three in total).

Abdomen: Tergite 1 black; tergite 2 wider along dorsal midline than tergites 3 to 7; tergites 2 to 7 black, all with dense short silver pubescence on dorso-lateral sides and with extensive long and short silver pubescence on lateral sides; tergite 8 black, covered in short silver pubescence; intersegmental membranes pale brown; epipleurites black, with sparse silver pubescence; sternite II black, often with pale brown areas on posterior dorso-lateral

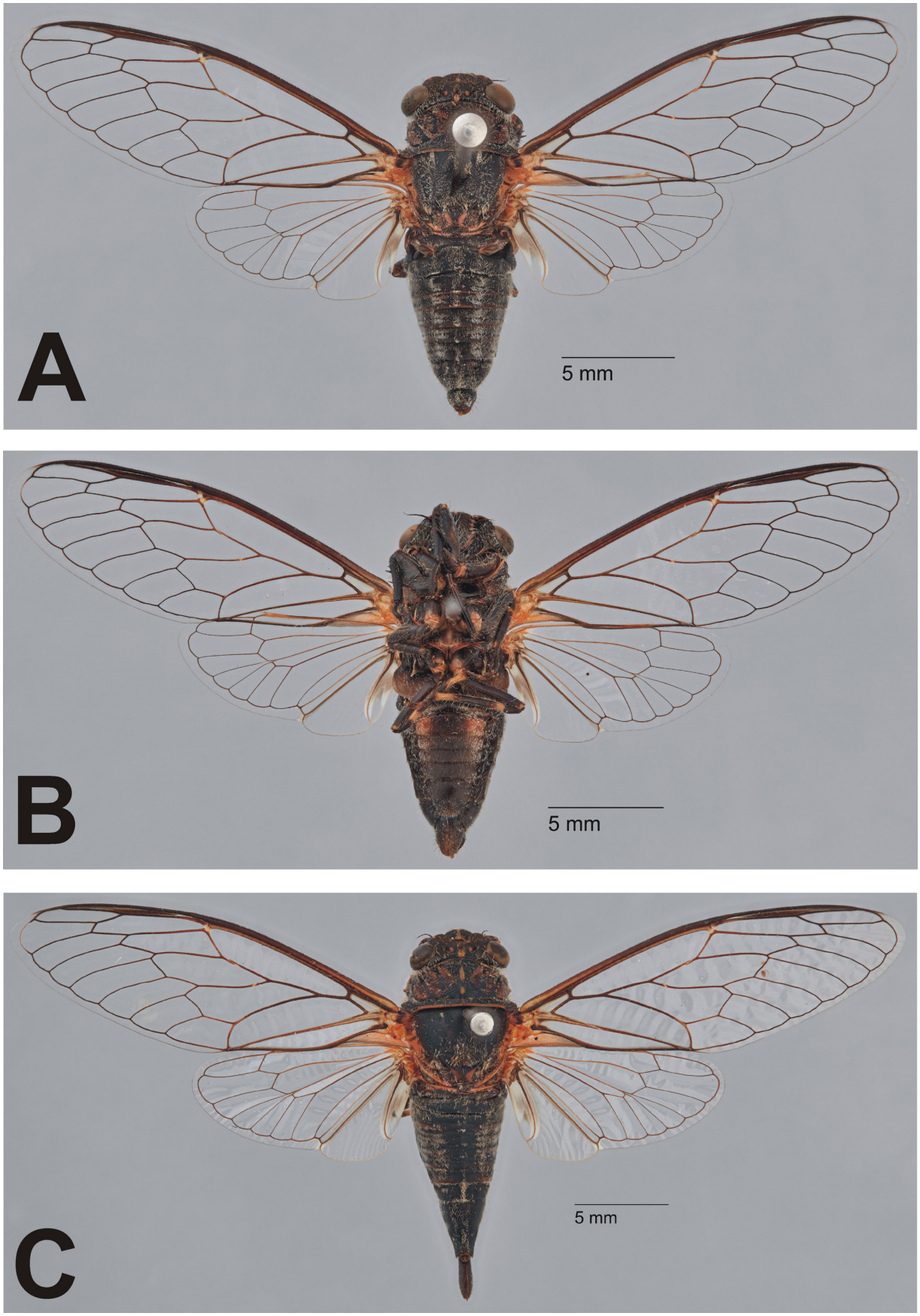

PLATE 3. *Myopsalta chrysopedia* **n. sp.**: (A) male holotype, Kalgoorlie (30°45'S 121°28'E), dorsal view; (B) male holotype, ventral view; (C) female paratype, Lake Douglas (30°52'S 121°24'E), dorsal view.

margins; sternites III to V black medially, with pale brown or pinkish-brown areas laterally, narrowing distally, being narrowest on sternite VI; sternite VI and VII dark brown to black; sternite VIII black; anterior sternites visible in lateral view.

Genitalia (Figs 3E, F): Pygofer black dorsally, grading to brown or pale brown ventrally; upper lobes in ventral view relatively linear, with terminals directed slightly inwards and tapering broadly; basal lobes in ventral and lateral views relatively linear, flat, curved towards apex, weakly expressed; median lobe of uncus rounded, exhibiting limited protrusion; claspers in ventral view conspicuous, diverging from point of downward deflection, with relatively broad apices; pseudoparameres projecting further (ventrally) than endotheca and ventral support; ventral support acute, projecting slightly beyond endotheca; endotheca fleshy.

Female (Plate 3C): Head, thorax, wings and legs usually match description of male.

Thorax: Pale specimens have a mostly brown thorax, with black sigilla and pronotal fissures.

Abdomen: Tergites 1 to 7 black, with extensive, short silver pubescence on dorso-lateral and lateral sides; auditory capsules black; abdominal segment 9 black, or, in pale specimens, brown with black longitudinal markings on dorsal and lateral sides, dark brown ventrally; dorsal beak black, sharply defined; sternite II dark brown to black medially, otherwise pale to medium brown; epipleurites generally black, pale brown along posterior margins; sternites III to VI pale brown with broad black areas medially, broadening posteriorly, typically similar in width, though often widest on sternite IV; sternite VII pale brown to brown with short, oblique, darker longitudinal markings medially; ovipositor sheath extends approximately 2.0 mm beyond termination of abdominal segment 9.

Measurements. N=15♂ 12♀. Ranges and means (in parentheses), mm; BL: ♂ 14.6–16.9 (16.06); ♀ 18.7–21.9 (19.95). FWL: ♂ 17.2–20.9 (18.97); ♀ 19.1–21.7 (20.33). HW: ♂ 4.6–5.1 (4.82); ♀ 4.7–5.5 (5.03). PW: ♂ 4.7–5.3 (5.05); ♀ 4.9–6.2 (5.34). AW: ♂ 4.5–5.5 (5.05); ♀ 4.6–6.1 (5.01). FWL/W: ♂ 2.91–3.32 (3.04); ♀ 2.86–3.26 (3.10); OL 7.6–9.5 (8.42).

Morphological distinguishing features. *Myopsalta chrysopedia* **n. sp.** can be distinguished from *M. binotata*, *M. lactea* and *M. waterhousei* by having fore wings that are hyaline, without apparent melanisms or infuscations on any veins. It can also be separated from these species, as well as from *M. coolahensis*, *M. libritor* and *M. wollomombii* by the colour of the plaga of each hind wing, which is grey-brown rather than white. Additionally, males and females can be separated from *M. albiventris*, *M. coolahensis* and *M. wollomombii* by the colouration of the sternites, which is predominantly dark brown (cf. almost entirely pale brown in those three species). They can be distinguished from *M. melanobasis* **n. sp.** and *M. platyptera* **n. sp.** by the appearance of the fore wing clavus, which is entirely hyaline and not opaque at the base. Males can be distinguished from *M. atrata*, *M. crucifera*, *M. gordoni* **n. sp.** *M. leona* **n. sp.**, *M. mackinlayi*, *M. parvula* **n. sp.**, *M. septa* **n. sp.** and *M. xerograsidia* **n. sp.**, by having a head width >4.6 mm. They can be differentiated from *M. bassiana* **n. sp.** and *M. majurae* **n. sp.** by their narrow fore wings (length/width ratio >2.9) and from *M. riverina* **n. sp.** by the short length of their rostrum, which does not extend beyond the mid coxae. In addition, they can be separated from *M. umbra* **n. sp.** by the colour of the costa, which are predominantly brown to dark brown rather than reddish-brown, and by the colour of the tergites, which are black (not reddish-brown). Finally, they can be distinguished from *M. longicauda* **n. sp.** by the colour of tergites 3–5 being black. Females can be separated from *M. leona* **n. sp.**, *M. crucifera* and *M. mackinlayi* by the length of the forewings, which is >19 mm. They can be reliably distinguished from the superficially similar *M. bassiana* **n. sp.**, *M. longicauda* **n. sp.**, *M. mackinlayi* **n. sp.**, *M. parvula* **n. sp.**, *M. septa* **n. sp.**, *M. umbra* **n. sp.** and *M. xerograsidia* **n. sp.** by the length of the ovipositor sheath, which extends approximately 2.0 mm beyond the apex of abdominal segment 9. In *M. bassiana* **n. sp.**, *M. mackinlayi*, *M. parvula* **n. sp.** and *M. umbra* **n. sp.**, the ovipositor sheath is notably shorter, whereas in *M. xerograsidia* **n. sp.**, *M. longicauda* **n. sp.** and *M. septa* **n. sp.** it is clearly longer.

Distribution, habitat and behaviour (Fig. 4). *Myopsalta chrysopedia* is found in southern Western Australia in the area bounded by Balladonia, Cape Arid, Ravensthorpe, Baladjie and Kalgoorlie. Populations occur in mallee woodland on sandplains. Adults have been collected between September and January. Their behaviour is unknown.

Calling song. Unknown.

Myopsalta crucifera (Ashton, 1912)

(Figs 1D, 2D, 3G, 3H, 4, 9, 10; Plate 4)

Melampsalta crucifera Ashton, 1912: 226, 227, Pl. 9a.

Cicadetta crucifera (Ashton, 1912): Moulds, 1988; Moulds, 1990: 3, 5, 8, 11, 159, 160, 167–169, Pl. 1, Pl. 19, Fig. 4, Fig. 8, Fig. 8a.

Myopsalta crucifera (Ashton, 1912): Moulds, 2012: 15, 17, 21, 74, 151–154, Fig. 163; Marshall, 2016: 10, Fig. 2B.

Types. **Holotype**: ♀ '*M. crucifera* Ashton type', 'Holotype', 'Ashton coll.', 'K67573' (**AM**). **Other material**. QUEENSLAND: 1♂ Mareeba (Railway carriage), ii.1911, Ashton Coll., K295926; 1♀ Cairns, A.M. Lea, Ashton Coll., *Melampsalta crucifera* Asht.; 1♂ ([damaged] 1♀ Kuranda, 14.i.[19]51, J. C. Brooks, K296002, K296003; 1♂ Cairns, N.Q. [19]17, J. F. Illingworth Collector, [19]79, K296005; 1♀ Ashton Coll., K296006; 1♀ [damaged] Cairns dist., A. M. Lea, Ashton Coll., K296007; 1♀ 30km E. Georgetown, 9.ii.2005, J. Hasenpusch, K209141 (**AM**); 1♂ 3♀ Baldwin Swamp East Bundaberg, 24.xi.1971, H. Frauca, ANIC Database No. 20 005354, [♂] BOLD Proc. ID ANICY899-11; 2♂ Bundaberg Creek, Bundaberg, 11.xi.1971, H. Frauca; 2♂ 1♀ Bundaberg Creek, Bundaberg, 14.xi.1971, H. Frauca; 1♂ Foothills of Mt Walsh Nat. Park, 10 km S. by E. of Biggenden, 1–2.i.1972, H. Frauca; 2♀ Queen's Park, Bundaberg, 4.xi.1971, H. Frauca; 1♀ Bundaberg, 1–2.xii.1971, H. Frauca; 1♀ Baldwin Swamp Fauna Reserve, Bundaberg, 2.iii.1979, H. Frauca; 1♀ 7–14 mi. W. of Herberton, via Watsonville, 1.v.1967, D. H. Colless; 1♂ Rockhampton, 4.ii.1923, J. L. F.; 1♂ Bundaberg, 24.52°S 152.21°E, iv.1971, H. Frauca, on *Eucalyptus* trunk; 2♀ 12 mi. E. of Duaringa, 18.iii.1958, I.F.B. Common; 3♀ Bundaberg, 26.i.1972, H. Frauca, Tea Tree Swamp, [1♀] ANIC Database No. 20 005352, BOLD Proc. ID ANICY897-11; 4♂ 2♀ Hedlow Ck nr Yeppoon, 22.iii.1958, I.F.B. Common; 1♂ Watalgan Ra, via Rosedale, 26.ii.1972, H. Frauca; 1♂ Baldwin Swamp nr Bundaberg, 7.iii.1973, H. Frauca; 2♂ Biggenden, Bluff Range, 9.i.1971, H. Frauca, [1♂] ANIC Database no. 005353, BOLD Proc. ID, ANICY898-11; 1♂ Biggenden, Bluff Range, 15.xii.1970, H. Frauca, Euc. Wdland; 1♀ Bundaberg, 17.x.1971, H. Frauca; 1♀ Bundaberg, 16.x.1971, H. Frauca; 1♂ Biggenden, Bluff Range fhills, 11.xii. 1972, H. Frauca; 2♂ Cordalba State Forest, SW of Bundaberg, 17.xii.1979, H. Frauca; 1♂ 2km S. Hors[es]hoe Lookout, Blackdown Tab., 23.46°S 149.06°E, 23–24.iv.1981, A. Calder; 1♂ 30 mi. SW. of Sarina, 27.iii.1962, Chinnick & Corby; 1♂ Annan River Cooktown, 1906, Brown, W. W. Froggatt Collection; 1♂ Stannary Hills, Cairns 2, 1905, Brown; 1♂ 5♀ Cairns, 7.i.1962, Carne & Britton; 5♀ Kuranda, 7.i.1962, Carne & Britton; 1♂ Ravenshoe, 7.i.1962, Carne & Britton (**ANIC**); 1♂ Woodgate, 26.ix–3.x.1998, L. Popple, J. Moss, 284-0002; 1♀ Base of Blackbutt Range, W. of Moore, 26.i.2002, L. Popple, R. MacSloy, 284-0016; 1♂ Rifle Creek, 16°38'S 145°20'E, 3.iii.2004, L. & W. Popple, recorded, 289-0001; 4♂ 11♀ Isla Gorge National Park, NE. corner, 25°10'S 150°01'E, 240 m, 3.iii.1998, C.J. Burwell & S.G. Evans, mercury vapour lamp; 4♂ 4♀ same data as previous, 4.iii.1998, C.J. Burwell; 1♂ Taroom district, Boggomoss 19, 25°25'S 150°01'E, 12–14.i.1997, C.J. Burwell, 205, QM Reg. No. T32747; 2♀ Boggomoss 30 via Taroom, 25°29'S 150°08'E, 14.xi.1996–i.1997, Cook & Monteith, flight intercept, 057, QM Reg. No. T36550, T36551; 4♂ 1♀ Finley Creek, E. base of Mt Abbott, 20°06'S 147°49'E, 13.iv.1997, C.J. Burwell; 1♂ Expedition Range National Park via Bauhinia, 25°18'10"S 149°04'32"E, 20–28.i.2014, R. Hobson; 1♂ Caves nr Rockhampton, [no date], R.L. Higgins; 2♂ 2♀ Emerald Hill, Mareeba, 16°58'S 145°26'E, 420 m, 24–25.ii.2001, G.B. Monteith, mercury vapour lamp, 10525; 6♂ 3♀ 4 km S. of Moranbah, 22°00'S 148°03'E, 240 m, ii–iii.2000, E. Knuck, mercury vapour lamp, 9205; 1♀ Cairns, 1942; 1♀ Springsure, 12.ix.1950, D.G. Tulloch; 2♂ King Plains, Quinkan Bush Blitz Helipad 13, 37386, 15.492°S 144.828°E, 160m, 14.iii.2017, Wright & Popple, hand netting, open woodland/sandy creek, QM Reg. Nos T236564, T236565; 2♂ Springvale, nr Quinkan Bush Blitz Helipad 14, 37388, 15.864°S 145.009°E, 197m, 15.iii.2017, Wright & Popple, hand netting, open woodland/rocky creek, QM Reg. Nos T236560, T236562 (**QM**); 1♂ Maryborough, 27.i.1951, W. Mungomery; 1♂ Brisbane, 15.xi.1958, R. Metcalfe; 1♀ Bundaberg, 16.viii.1960, J.E. Connor; 1♂ Rockhampton, ii.1953, L.W. Rule; 1♀ Cleveland, 18.x.1953; 1♂ Brisbane, 1.i.1952, D. Teakle; 1♂ Nagoorin, i.1955, J.K. Leslie; 1♀ Gatton, 20.xii.1948, C.S. Andrew; 1♀ Mt Lind[e]say, 17.xi.1953, G. Hooper; 1♀ Mon to, i.1954, C. Flynn (**UQIC**); 1♂ Rifle Creek, 1 km N. of Mount Molloy, 16°40.04'S 145°19.71'E, 15.xii.1999, A. Ewart, recorded; 2♂ 1♀ Cattle Creek, 95 km N. of Marlborough, 22°10.24'S 149°30.40'E, 8.ii.2002, A. Ewart, grass; 3♂ 1♀ 6.2 km E. of Woodstock, Giru Road, 19°36.08'S 146°53.76'E, 3.ii.2002, A. Ewart, grass/woodland; 2♂ 1♀ Plantation Creek, 1.5 km W. of creek landing, via Ayr, 19°31.11'S 147°30.03'E, , 4.ii.2002, A. Ewart; 6♂ 2♀ same data as previous, 6.ii.2002; 6♂ 5♀ Plantation Creek, Ayr, 19°32.12'S 147°30.01'E, 14–16.v.2004, A. Ewart & I. Rattray; 2♂ 1♀ same data as previous, 3.ii.2006, A. Ewart, grassland; 1♂ same data as previous, 7.ii.1999, A. Ewart; 4♂ 2♀ same data as previous, 9.ii.1999; 1♂ same data as previous, 9.ii.1998, recorded; 1♂ same data as previous, 7.ii.1999; 1♂ same data as previous, recorded; 2♂ Base of Flagstaff Hill, Bowen, 20°00.77'S 148°15.31'E. 21.ii.2003, A. Ewart, grass flats; 1♂ 41.5 km S. of Clairview, Bruce Highway, 22°27.14'S 149°28.91'E, 2.ii.2006, A. Ewart, grass; 1♂ 11.4 km W. of Mount Surprise, 18°11.01'S 144°13.27'E, 20.i.2005, A.

Ewart, low trees; 1♂ 0.5 km W. of Wyseby/ Rewan road junction, 24°58.25'S 148°31.42'E, 16.i.2005, A. Ewart, grass, recorded; 9♂ Mount Surprise Road, E. side of the Einasleigh River crossing, 18°11.15'S 144°00.77'E, 24.i.2005, A. Ewart; 4♂ same data as previous, 26.i.2005; 2♂ same data as previous, 27.ii.2003; 5♂ same data as previous, 2.iii.2003; 1♂ 60.2 km SE. of Greenvale (24 km SE. of the Clarke River), 19°13.73'S 143°26.90'E, 23.ii.2003, A. Ewart, grass; 4♂ 14.4 km NW. of Hann Creek via Charters Towers, 19°51.37'S 146°05.47'E, 2.ii.2002, A. Ewart, grass/low woodland; 2♂ 5 km S. of Tiaro, 30.i.1983; Maryborough airport, 3.xii.1977, low grass; 1♂ 2 mi N. of Ayr, 25.i.1981; 1♂ Jerona near Ayr, 26.i.1981; 5♂ Splitters Creek, 25.i.1979; 1♂ same data as previous, 2nd recording in field, grass cicada; 14♂ Plantation Creek, Ayr, 24.xii.1981, grass flats; 7♂ 9♀ same data as previous, 25.xii.1981; 4♂ Jerona near Ayr, 26.xii.1981; 1♂ Ayr, 29.i.1981;2♂ Ayr, 20.ii.1986, A. Ewart; 13♂ 3♀ Isla Gorge National Park, NE. corner, 25°10.02'S 150°00.73'E, 17.xii.2000, A. Ewart, grass; 2♂ 3♀ Plantation Creek, ~1 km from boat landing, Ayr, 19°32.12'S 147°30.01'E, 23.ii.2000, A. Ewart, recorded, grassland; 4♂ 5♀ 1 km from Plantation Creek, Ayr, 19°32.11'S 147°30.06'E, 9.ii.1998; 6♀ 6♂ same data as previous; 1m # 1 km SW. of Alva Beach near Ayr, 19°27.72'S 147°28.58'E, 25.ii.2000, A. Ewart; 1♂ Alva Beach near Ayr, 19°27.37'S 147°28.08'E, 25.ii.2000, A. Ewart, grass; 1♂ 1♀ 35 km S. of Townsville, Mt Storth, base of microwave tower road, 8359/ 014553, 7.ii.1998; 1♀ Brigalow Research Station near Theodore, eastern brigalow section, 24°48.54'S 149°47.54'E, 21.xii.2000, A. Ewart, belah; 1♂ 1.7 km E. of Rewan/ Carnarvon National Park Road junction, 24°48.50'S 148°23.20'E, 18.xii.2004, A. Ewart, grass; 1♂ Cracow Univ. House, 18.ii.1979 (**AE**); 1♀ Julatten, N. Qld, 15.ii.1981, A. Walford-Huggins; 5♂ 2♀ Julatten NE. of Mt Molloy, B. Qld, 1.i.1977, M.S. & B.J. Moulds; 59♂ 13♀ same data as previous, 9.i.1977, 1♂ genitalia prep. CI76; 1♀ Mt Molloy Qld, 4.i.1974, A. & M. Walford-Huggins, 1♂ 1♀ same data as previous, 9.i.1977, figured in A Guide to Australian Cicadas; 1♂ Trinity Beach nr Cairns, 27.ii.1982, M.S. & B.J. Moulds, 3♂ 2♀ same data as previous, 7.i.1984; 1♂ Kuranda, 10.ii.1975, G.R. Brown; 1♂ Kuranda, 13.i.1983, G. Wood; 1♀ Smiths Creek via Cairns, 16.iii.1973, A.& M. Walford-Huggins; 1♂ Kamerunga, Cairns, 19.ii.1973, A. &M. Walford-Huggins; 1♂ 2♀ 16°21'S 144°43'E, Cape York, Mt Carbine, Harbord Ck, 21.iii.2007, D.C.F. Rentz, J. Hasenpusch, Stop 9; 1♂ AU.QL.CRX, Carnarvon Ck xing, ~25 km NE. of Carnarvon Gorge, 24°58.703'S 148°23.258'E, 309 m, 28.xii.2008, Hill, Marshall, Moulds, Owen; 1♂ Bundaberg, 31.i.1982, C.E. Hagan; 14♂ Kilkivan, 25.xii.1993, M.S. & B.J. Moulds; 1♂ 2♀ Little Laura River, 'Jowalbinna', 15°46'S 144°14'E, 8.v.1989, G. and A. Daniels; 1♂ Black River nr Townsville, 18.ii.1993, T. Woodger; 1♂ same data as previous, 21.iv.1990; 1♂ same data as previous, 22.ii.1992; 1♂ 1♀ Tinaroo Ck road, 20 km SE. of Mareeba, 12.ii.1989, H. & A. Howden; 1♂ Wondecla nr Herberton, 6.i.1990, M.S. & B.J. Moulds; 1♂ Fairymead Plantation, Bundaberg, ex sugar cane field, 20.x.1977, R. M. Bull; 1♂ Lotus Creek S. of Sarina, 4.ii.1975, Walford-Huggins; 1♂ 11 km N. of Tully, 15–16.xii.1984, R. de Keyzer; 1♂ China Camp, C.R.E.B. road, SW. of Bloomfield, 2.i.1984, M.S. & B.J. Moulds; 1♀ Laura R., at old h'stead, 4.iv.1984, A. Walford-Huggins; 1♂ Habana, Mackay, i.1984, B. Van Moolenbrock; 1♀ Townsville, 1.ii.1981, M.S. & B.J. Moulds; 1♂ Rockhampton, 23.xii.1972, M.S. & B.J. Moulds; 1♀ Rifle Ck, 20.ii.1975, G.R. Brown; 1♀ Ravenswood, 17.ii.1999, T. Woodger; 1♂ Rockhampton, 26.iii.1973, A. Atkins; 1♀ 'Mourangee' Hsd, nr Edungalba, 16.iii.1983, E. E. Adams; 2♂ 1♀ same data as previous, 19.iii.1988, M.S. & E.E Adams; 1♂ 1♀ Bakerville, 2.iii.1970, J.D. Brown, water trap; 1♂ same data as previous, iii.1970; 1♀ 15 km W. of Charters Towers, 19.iii.1984, A. Hiller; 4♂ 1♀ 'Silver Hills', Richmond, 14.iii.2000, T. Woodger (**MSM**); 1♂ Woodgate, 26.ix–3.x.1998, L. Popple, J. Moss, 284-0001; 4♂ Mt Minto, 19.xii.1998, J. Moss, L. Popple, 284-0003 to 284-0006; 1♂ Glebe Weir near Taroom, 4–5.xii.1999, J. Moss, L. Popple, 284-0007; 3♂ Brigalow Research Station WNW. of Theodore, 5–12.xii.1998, J. Moss, L. Popple, 284-0008 to 284-0010; 1♂ 10 km SE. of Brigalow Research Station via Theodore, grassy floodway adjacent to a bus stop, 11.xii.1999, J. Moss, L. Popple, 284-0011; 2♂ Peak Crossing, 18.i.2001, L. Popple, J. Moss, 284-0013, 284-0014; 1♀ Base of Blackbutt Range, W. of Moore, 9.i.2002, L. Popple, M. Moulds, J. Moss, J. Cooley, D. Marshall, K. Hill, 284-0015; 1♀ same locality as previous, 26.i.2002, L. Popple, R. MacSloy; 1♂ Mt Flinders Road N. of Peak Crossing, , 9.i.2003, L.W. & J.M. Popple, 284-0018; 1♂ Lake Dyer via Laidley, 22.ii.2003, L. Popple, R. MacSloy, 284-0019; 1♂ Kilcoy district (Jimna Road), 2.iii.2003, L. Popple, R. MacSloy, 284-0020; Mareeba, 17°00'S 145°26'E, 2.ii.2004, L. & W. Popple, 284-0021; 2♂ East Mary Road, 16°34'S 145°13'E, 4.iii.2004, L. & W. Popple, 284-0022, 284-0023; 1♂ Kilcoy district, 26°55'31"S 152°33'59"E, 19.ii.2005, L. Popple, R. MacSloy, 284-0024; 1♂ Herberton district, 17°23'22"S 145°21'02"E, 26.xii.2010, L. Popple & A. McKinnon, 284-0025; 1♂ Corrumburra, 23°02.103'S 149°55.108'E, 13.iii.2013, P. Lloyd, 291-0013 (**LWP**); NEW SOUTH WALES: 1♂ Kyogle, 1.xii.1954, Talbot (**QM**).

Description. Male. (Figs 1D, 2D, 3G, 3H; Plates 4A–C).

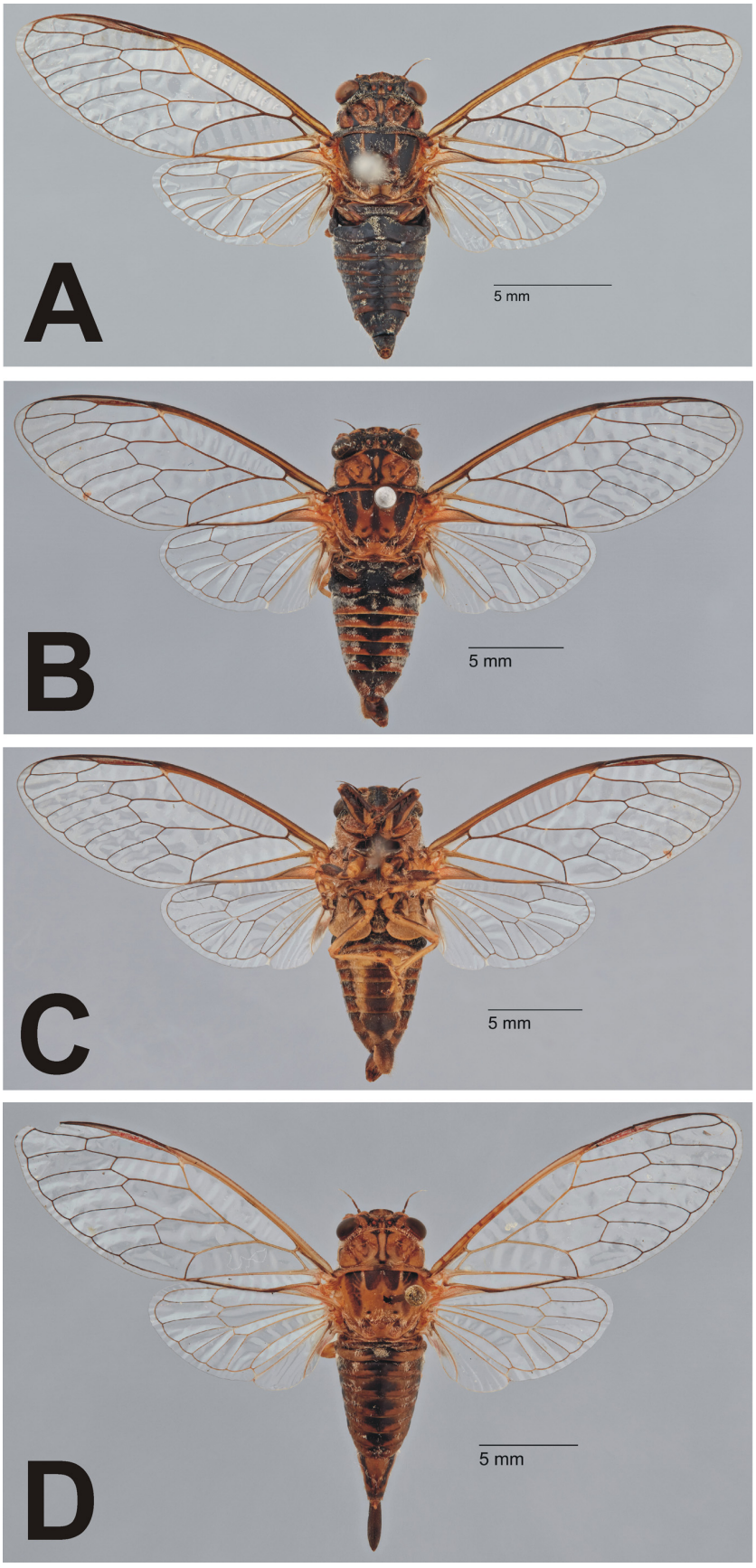

PLATE 4. *Myopsalta crucifera* (Ashton): (A) male (dark form), 60.2 km SE. of Greenvale (19°14'S 143°27'E), dorsal view; (B) male (typical brown form), Woodgate (25°06'S 152°33'E), dorsal view; (C) male, same as previous, ventral view; (D) female, base of Blackbutt Range (26°53'S 152°13'E), dorsal view.

Head: Postclypeus predominantly orange-brown to pale brown, dark brown to black anterio-laterally and ventro-medially, sometimes pale brown medially; supra-antennal plates brown to pale brown; genae black or predominantly pale brown; mandibular plates principally pale to dark brown, dark brown to black centrally, with silver pubescence; vertex and frons dark brown to black, tending pale brown anterio-laterally, surrounding epicranial suture and sometimes on outer margins near compound eyes and also along medial line; ocelli pink; compound eyes brown; anteclypeus pale brown to orange-brown; rostrum brown, dark brown apically, extending to posterior margins of mid coxae; antennae brown to dark brown.

Thorax: Pronotum brown to pale brown with mottled dark brown to black colouration surrounding paramedian and lateral fissures and dorso-laterally anterior to pronotal collar; central fascia brown to pale brown, surrounded with black colouration, which broadens conspicuously towards anterior pronotal margin; pronotal collar mostly brown to pale brown, tending dark brown anteriorly and on lateral angles; metanotum dark brown; mesonotum predominantly brown to pale brown; submedian sigilla black, or occasionally brown; lateral sigilla dark brown to black with diffuse dark reddish-brown or pale brown areas; cruciform elevation and wing grooves pale brown; posterior third of mesonotum with dense fine and sparse long silver pubescence.

Wings: Fore wings hyaline; basal membranes orange to pale orange-brown; pterostigmata orange; costal veins pale brown; other veins pale brown to brown, darker distally. Hind wing plagas white at base, grey medially; jugal folds white to grey, hyaline apically; veins pale brown to dark brown throughout.

Legs: Fore coxae with anterior outer sides brown, posterior sides pale brown with dark brown longitudinal markings; mid and hind coxae pale brown with dark brown markings on anterior and posterior sides; meracantha spikes pale brown, dark brown basally, overlapping opercula; fore femora pale brown with broad brown to dark brown longitudinal markings on outer anterior and posterior sides; mid femora brown, darker on dorsal side, with pale brown apices; hind femora pale with narrow dark brown longitudinal markings on anterior and dorsal sides; fore tibiae brown to dark brown; mid and hind tibiae pale brown; fore tarsi brown; mid and hind tarsi pale brown; pretarsi brown to dark brown; claws pale brown, darker apically.

Opercula (Fig. 1D): Broadly rounded; pale brown; plates undulating with medial areas slightly depressed.

Timbals (Fig. 2D): Anterior rib 5 abbreviated; rib 4 also abbreviated, with a prominent isolated remnant extension ventrally; ribs 1 and 2 joined ventrally and fused dorsally to basal spur; anterior termination of basal spur fused with ribs 3–4, with rib unattached; prominent intercalary short ribs in medial areas between ribs 1 and 2, 2 and 3, and 3 and 4 (three in total).

Abdomen: Tergite 1 dark brown; tergite 2 wider along dorsal midline than tergites 3 to 7; tergites 2 to 7 dark brown, with orange-brown to yellow-brown areas on dorso-lateral posterior margins; tergite 8 dark brown with brown areas on dorso-lateral sides, not reaching anterior margin; tergites 2 to 8 with dense short silver pubescence on dorso-lateral sides and with extensive long and short silver pubescence on lateral sides; intersegmental membranes pale yellow-brown; epipleurites dark brown anteriorly grading to orange-brown posteriorly, with sparse silver pubescence; sternite II black laterally, pale brown ventro-laterally, with a dark brown area medially; sternite III pale brown with a narrow brown area medially, broadening posteriorly; sternites IV to VI pale brown with brown areas medially; sternite VII dark brown with pale brown lateral margins; sternite VIII dark brown to black; anterior sternites visible in lateral view.

Genitalia (Figs 3G, 3H): Pygofer brown to dark brown; upper lobes in ventral view relatively linear, with terminals directed dorsally and apically acute; basal lobes in ventral and lateral views outwardly curved and slightly bulbous; median lobe of uncus rounded, protruding slightly; claspers in ventral view conspicuous, diverging in apical half, with narrow, thoroughly relatively blunt, apices; pseudoparameres projecting further (ventrally) than endotheca and ventral support; ventral support acute, projecting slightly beyond endotheca; endotheca fleshy.

Female (Plate 4D): Head, wings and legs match description of male.

Thorax: Pronotum brown to pale brown; central fascia pale brown, surrounded with black colouration, which broadens conspicuously towards anterior pronotal margin; pronotal collar mostly brown to pale brown, tending dark brown on margins of lateral angles; metanotum dark brown; mesonotum brown to pale brown; submedian sigilla dark brown to black; lateral sigilla pale brown to dark brown, typically with diffuse pale brown areas; cruciform elevation and wing grooves pale brown; posterior third of mesonotum with dense fine and sparse long silver pubescence.

Abdomen: Tergite 1 brown to dark brown; tergites 2 to 8 pale brown to brown, with brown to dark brown areas

medially, broader on anterior half and up to three times narrower on posterior half, narrowing towards posterior margin; auditory capsules dark brown to black; abdominal segment 9 pale brown to brown, with dark brown dorso-lateral longitudinal markings; dorsal beak dark brown, sharply defined; sternite II pale brown; epipleurites brown to pale brown; sternites III to VI pale brown with brown to dark brown areas medially, broadening posteriorly; sternite VII pale brown; ovipositor sheath extends approximately 2.0–2.5 mm beyond termination of abdominal segment 9.

Measurements. N=15♂ 15♀. Ranges and means (in parentheses), mm; BL: ♂ 11.9–14.5 (12.93); ♀ 14.1–18.5 (16.15). FWL: ♂ 14.0–18.8 (15.53); ♀ 15.3–19.2 (17.11). HW: ♂ 3.6–4.2 (3.86); ♀ 3.9–4.4 (4.08). PW: ♂ 3.7–4.6 (4.03); ♀ 3.9–4.9 (4.30). AW: ♂ 3.8–4.9 (4.34); ♀ 4.0–4.9 (4.39). FWL/W: ♂ 2.55–2.96 (2.74); ♀ 2.64–3.00 (2.85). OL: ♀ 6.4–8.4 (7.29).

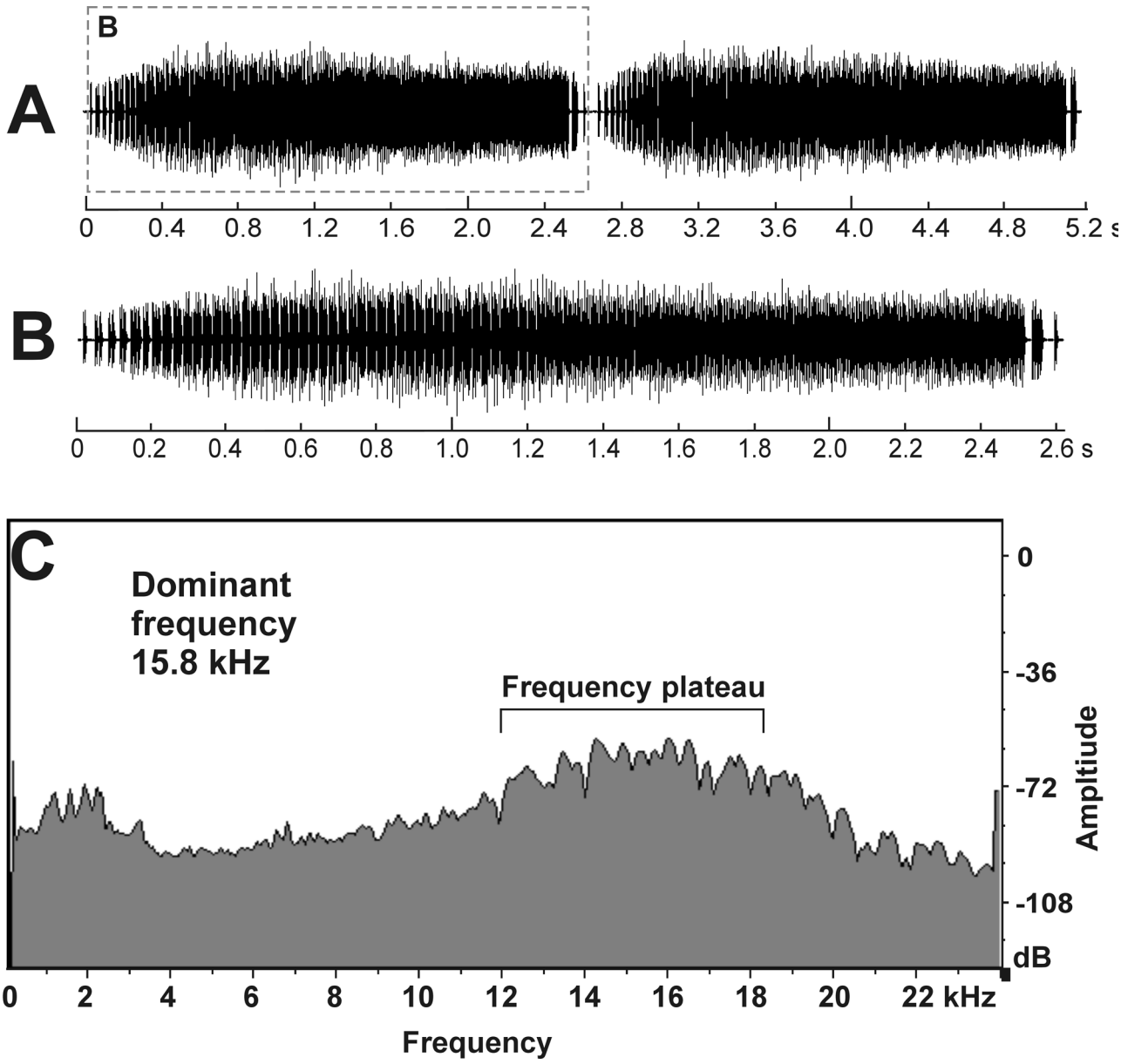

FIGURE 9. Male calling song structure of *Myopsalta crucifera* (Ashton) from a recording obtained by the author at Kings Plains (15°30'S 144°50'E) using RS6 (see Methods). (A) Wave plot of two complete phrases, each containing a long echeme followed by a macrosyllable. (B) Expanded wave plot showing the structure of one complete phrase, with a long echeme, macrosyllable and ending in a single syllable. (C) Spectrogram showing the highest amplitude frequency plateau and dominant frequency.

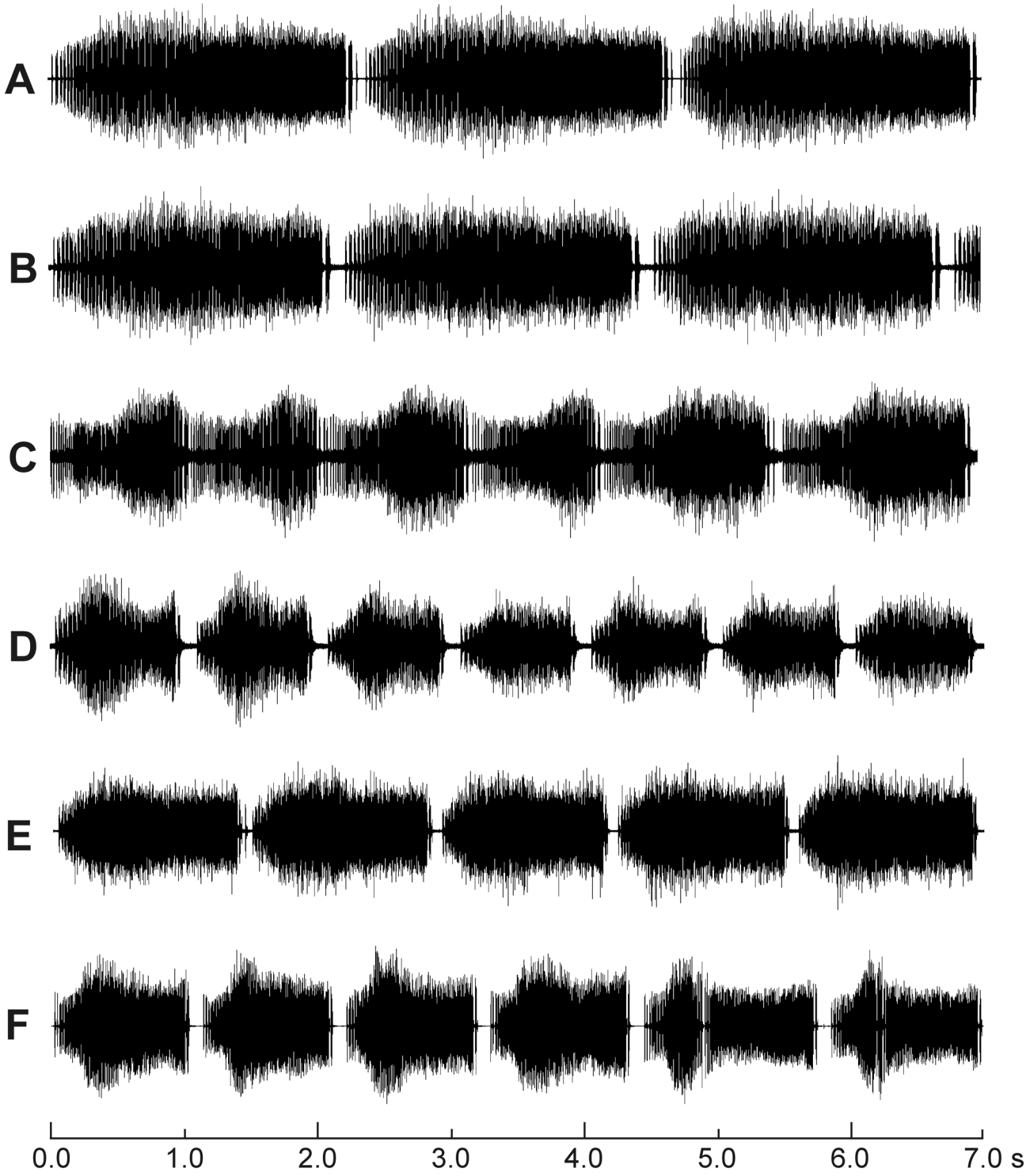

FIGURE 10. Wave plots illustrating the calling song of *Myopsalta crucifera* (Ashton) from six different locations, including (A) Kings Plains (15°30'S 144°50'E), (B) Herberton (17°23'S 145°21'E), (C) Emerald (23°37'S 148°13'E), (D) Woodgate (25°06'S 152°33'E), (E) base of Blackbutt Range (26°53'S 152°13'E), and (F) 3 km S. of Peak Crossing (27°49'S 152°44'E). Recordings were obtained by the author using RS6 (A), RS1 (B, C, D) and RS2 (E, F) (see Methods).

Morphological distinguishing features. *Myopsalta crucifera* can be distinguished from *M. atrata*, *M. binotata*, *M. coolahensis*, *M. gordoni* **n. sp.**, *M. lactea*, *M. libritor*, *M. waterhousei* and *M. xerograsidia* **n. sp.** by the colour of the basal membranes of the fore wings, which is pale brown or pale orange rather than white to pale grey. It can be distinguished from *M. melanobasis* **n. sp.** and *M. platyptera* **n. sp.** by the appearance of the fore wing clavus, which is entirely hyaline and not opaque at the base. Males and females can be separated from *M.*

albiventris **n. sp.** and *M. wollomombii* by the colouration of the sternites, which is predominantly dark brown (cf. almost entirely pale brown). Males can be distinguished from *M. bassiana* **n. sp.**, *M. chrysopedia* **n. sp.** *M. longicauda* **n. sp.**, *M. mackinlayi*, *M. majurae* **n. sp.,** *M. parvula* **n. sp.**, *M. riverina* **n. sp.** and *M. umbra* **n. sp.** by the colouration of sternite VII, which is brown to dark brown and bordered with pale brown on the lateral margins rather entirely dark brown to black. In south-east Queensland, they can be distinguished from the closely similar *M. septa* **n. sp.** by the colour of the dorso-lateral sides of the tergites, which is brown (not black). Females can be distinguished from *M. bassiana* **n. sp.**, *M. mackinlayi* **n. sp.**, *M. longicauda* **n. sp.**, *M. parvula* **n. sp.**, *M. septa* **n. sp.** and *M. umbra* **n. sp.** by the length of the ovipositor sheath, which extends approximately 2.0–2.5 mm beyond the apex of abdominal segment 9; this length being approximately equal to the length of abdominal segment 9 (in other species the sheath extension is noticeably longer or shorter than the abdominal segment). They can be differentiated from *M. chrysopedia* **n. sp.** and the superficially similar *M. leona* **n. sp.** by the colouration of the thorax and dorsal abdomen, which is pale brown rather than dark brown to brown or black.

Distribution, habitat and behaviour (Fig. 4). *Myopsalta crucifera* is found from near Cooktown south through coastal and subcoastal Queensland to Kyogle in northern New South Wales. It has also been recorded further inland in the vicinity of Mount Surprise and from near Carnarvon Gorge in northern and central Queensland respectively. Populations occur in open grassland, grassy woodland, paddocks, crops (e.g. Sugarcane; see Moulds, 1990), in mangrove communities and in open forest where the adults are typically found on low vegetation including grass. Adults have been found from September to April. Males sing frequently during warm, sunny conditions.

Calling song (Figs 9, 10). The song of this species contains simple, repetitive buzzing phrases, each beginning softly then rising sharply to a constant amplitude for the remainder. Each phrase commences with a long echeme of 0.800–6.150 s duration, followed by a brief gap (0.008–0.040 s) and a syllable or macrosyllable of 0.006–0.028 s duration (all statistics, n=49 recordings). Occasionally, an additional syllable or macrosyllable is produced at the end of the phrase. Each phrase concludes with a gap of 0.021–0.191 s duration. When short gaps occur, the phrases often appear to follow on continuously. In the absence of direct observations, it is presumed that the female would respond with a wing flick during longer gaps at the end of each phrase. Close inspection of the structure within the long echeme at the start of each phrase often reveals that the beginning of this echeme contains a series of discrete syllables, although in some cases these syllables at the beginning of each long echeme may be entirely coalesced. Indeed, there is a progression from isolated short syllables to isolated longer syllables, to coalesced syllables.

The calling song typically exhibits a highest amplitude frequency plateau between 12.0 and 18.6 kHz. There appears to be no dramatic modulation in frequency during production of the calling song.

Myopsalta gordoni **n. sp.**

(Figs 1E, 2E, 3I, 3J, 11, 12; Plate 5)

Notopsalta sp. nr *atrata* Black Acacia Buzzer: Popple & Strange, 2002: 21, 22, 25, 29, Fig. 3A, Fig. 6D, Table 1.
Myopsalta sp. nr *atrata* Black Acacia Buzzer (Popple & Strange, 2002): Sanborn, 2014: 583.

Types. **Holotype**: ♂ 82 km N. of St George, 30.xii.2001, L. Popple & A. Strange, 279-0008, QM Reg. No. T239566 **(QM)**; **Paratypes**: QUEENSLAND: 1♀ same data as holotype, 279-0010 (**QM**); 1♀ 1.0 km SE. along Bollon Road from jct. with Cunnamulla Highway, Charleville, 26°25.49'S 146°15.73'E, 12–14.i.2010, A. Ewart, *E. gilesii* heath (**AE**); 2♂ 2♀ Queensland, Myall Park, 8 km N. of Glenmorgan, 27–28.xii.2001, L. Popple & A. Strange, 279-0001 to 279-0005; 2♀ same data as previous, 28.xii.2001, 279-0006, 279-0007; 1♀ same data as holotype, 279-0009 (**LWP**); 1♂ AU.QL.MVA, 45 km NW. of Morven, 26°06.823'S 146°51.993'E, 440 m, 8.ii.2008, K. Hill, D. Marshall, M. Moulds, C. Owen, M. Humphrey, C. Simon Lab Voucher, legs in ETOH, body pinned, 08.AU.QL.MVA.02, Notopsalta 'Morven', specimen recorded (**MSM**).

Etymology. This species is named after the late Mr David Gordon, a botanical collector and conservationist who established Myall Park Botanical Gardens. This property preserves a variety of vegetation communities and a correspondingly high diversity of cicadas.

Description. Male. (Figs 1E, 2E, 3I, 3J; Plates 5A, 5B).

Head: Postclypeus predominantly black, brown to orange-brown in grooves along lateral margins and with an orange-brown spot medially when viewed from anterior side; supra-antennal plates dark brown to black; genae and

mandibular plates black, covered by silvery pubescence; frons black; vertex black with a brown area extending along epicranial suture from between lateral ocelli to posterior margin; vertex and frons with sparse silvery pubescence; ocelli pink to pale red; compound eyes brown; anteclypeus dark reddish-brown to black; rostrum dark reddish-brown, black apically, clearly extending to anterior margins of hind coxae; antennae dark brown to black.

Thorax: Pronotum dark reddish-brown; central fascia brown, surrounded with black colouration, which broadens conspicuously towards anterior and posterior pronotal margins; interior pronotum with irregular black patches near paramedian and lateral fissures; narrow black areas present along lateral margins; pronotal collar predominantly black, with dark brown dorso-lateral and sometimes medial posterior margins; metanotum black; mesonotum, including submedian and lateral sigilla, black, with dark brown areas between the submedian and lateral sigilla extending towards arms and on to lateral sides of cruciform elevation and posterior half of wing grooves; posterior third of mesonotum with dense fine and mid-dense long silver pubescence.

Wings: Fore wings hyaline; basal membranes pale orange to grey-brown; pterostigmata reddish-brown; veins, including costal vein, dark brown. Hind wing plagas white at base, pale grey-brown, this colour extending along jugal folds and terminating before apices, hyaline over remainder; veins brown basally, dark brown on distal half.

Legs: Fore coxae dark brown, with narrow longitudinal brown bands on lateral sides, brown apically; mid and hind coxae dark brown, with pale brown to brown longitudinal bands on anterior side, apices pale brown to brown; meracantha spikes dark brown, becoming pale brown apically, overlapping opercula; fore femora brown to dark brown with pale brown longitudinal bands on posterior lateral and anterior sides; mid femora dark brown; hind femora dark brown to brown; fore tibiae dark brown; mid and hind tibiae dark brown, each with two pale brown to brown bands, one above base, other towards apex, hind tibiae paler; fore tarsi dark brown; mid tarsi brown; hind tarsi pale brown; pretarsi and claws brown.

Opercula (Fig. 1E): Broadly rounded; dark brown basally, brown to pale brown on outer plates; plates flat, with medial areas weakly depressed.

Timbals (Fig. 2E): Anterior rib 5 abbreviated; rib 4 also abbreviated, with a prominent isolated remnant extension ventrally; ribs 1 and 2 joined ventrally and fused dorsally to basal spur; anterior termination of basal spur fused with ribs 3–4, with rib 5 unattached; prominent intercalary short ribs in medial areas between ribs 1 and 2, 2 and 3, and 3 and 4 (three in total).

Abdomen: Tergite 1 black; tergite 2 wider along dorsal midline than tergites 3 to 7; tergites 2 to 7 principally black, with dark brown to brown areas on dorso-lateral posterior margins, all with short silver pubescence on dorso-lateral sides and with extensive long and short silver pubescence on lateral sides; tergite 8 dark reddish-brown to black, covered in short silver pubescence; intersegmental membranes pale brown; epipleurites dark reddish-brown, with sparse silver pubescence; sternite II black laterally, pale reddish-brown ventro-laterally, with a dark brown area medially; sternite III pale reddish-brown, often with a dark brown area medially, which broadens posteriorly; sternites IV, V and sometimes VI pale reddish-brown laterally, with dark brown areas medially, which broaden posteriorly, gradually increasing in size distally in each successive sternite; sternite VI entirely dark reddish brown in some specimens; sternites VII and VIII dark reddish brown; anterior sternites visible in lateral view.

Genitalia (Figs 3I, J): Pygofer dark brown to black; upper lobes in ventral view relatively linear, with terminals directed inwardly and dorsally, apically acute; basal lobes in ventral view slightly curved to follow axis of pygofer, in lateral view directed outwards towards apices, apically rounded; median lobe of uncus relatively blunt and abrupt; claspers in ventral view conspicuous, diverging markedly from point of downward deflection, with sharply developed apices; pseudoparameres projecting further (ventrally) than endotheca and ventral support; ventral support acute, projecting slightly beyond endotheca; endotheca fleshy.

Female (Plate 5C): Head, thorax, wings and legs match description of male.

Abdomen: Tergite 1 dark brown to black; tergite 2 dark brown to black, in paler specimens sometimes with brown areas on dorso-lateral sides' tergites 3 to 8 dark brown to black, sometimes with diffuse brown areas on posterior dorso-lateral margins; auditory capsules black; abdominal segment 9 dark reddish-brown to black, brown ventrally; dorsal beak black, sharply defined; sternite II pale brown to pale reddish-brown; epipleurites dark brown to black anteriorly, tending brown to pale brown posteriorly; sternite III pale reddish-brown, sometimes with a dark brown area medially on posterior half; sternites IV to VI pale reddish-brown with dark brown to black areas medially, broadening posteriorly, typically similar in width, though often widest on sternite IV; sternite VII pale reddish-brown; ovipositor sheath extends approximately 3.0–3.5 mm beyond apex of abdominal segment 9.

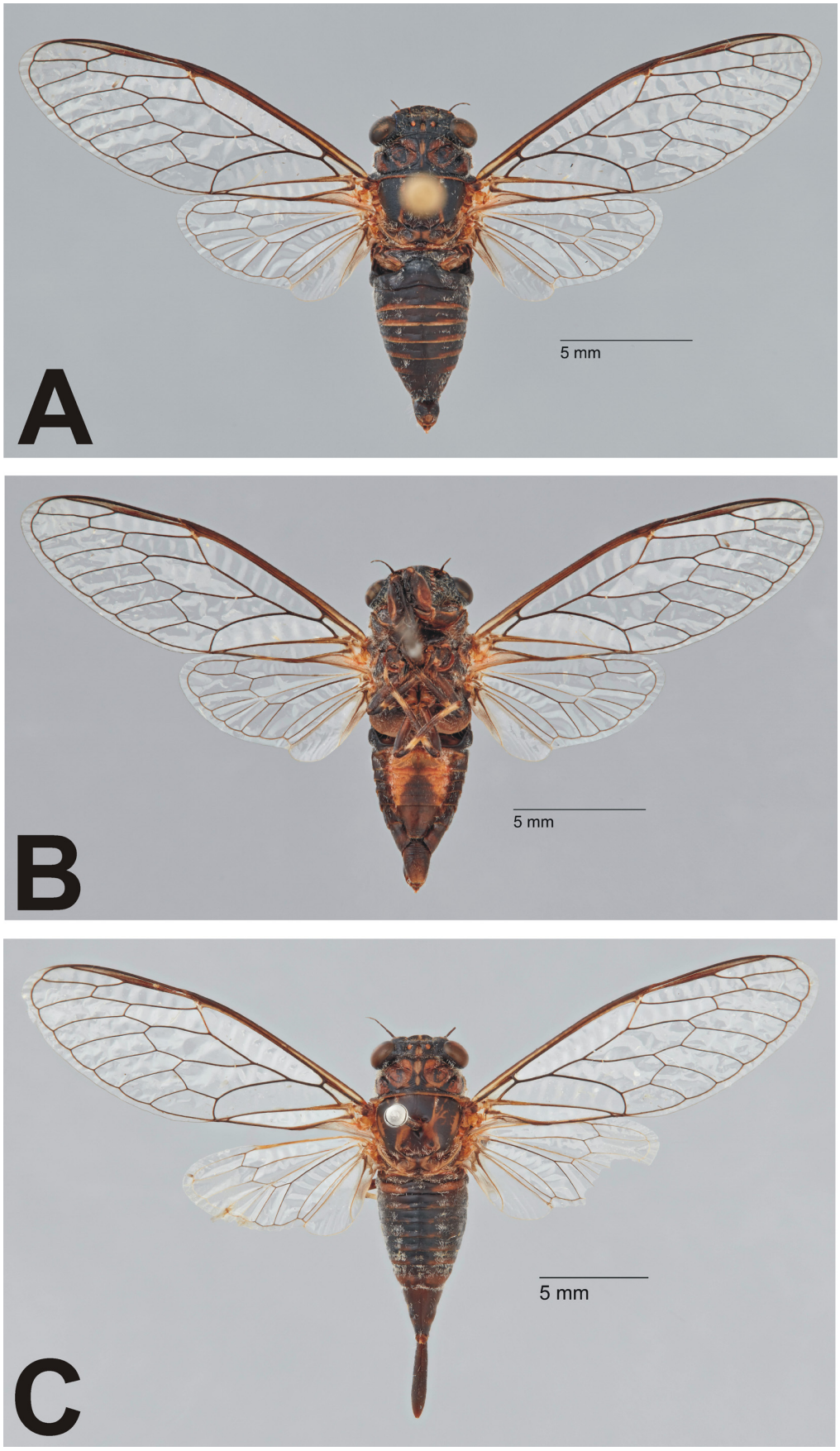

PLATE 5. *Myopsalta gordoni* **n. sp.**: (A) male holotype, 82 km N. of St George (27°23'S 148°52'E), dorsal view; (B) male holotype, ventral view; (C) female paratype, same locality as holotype, dorsal view.

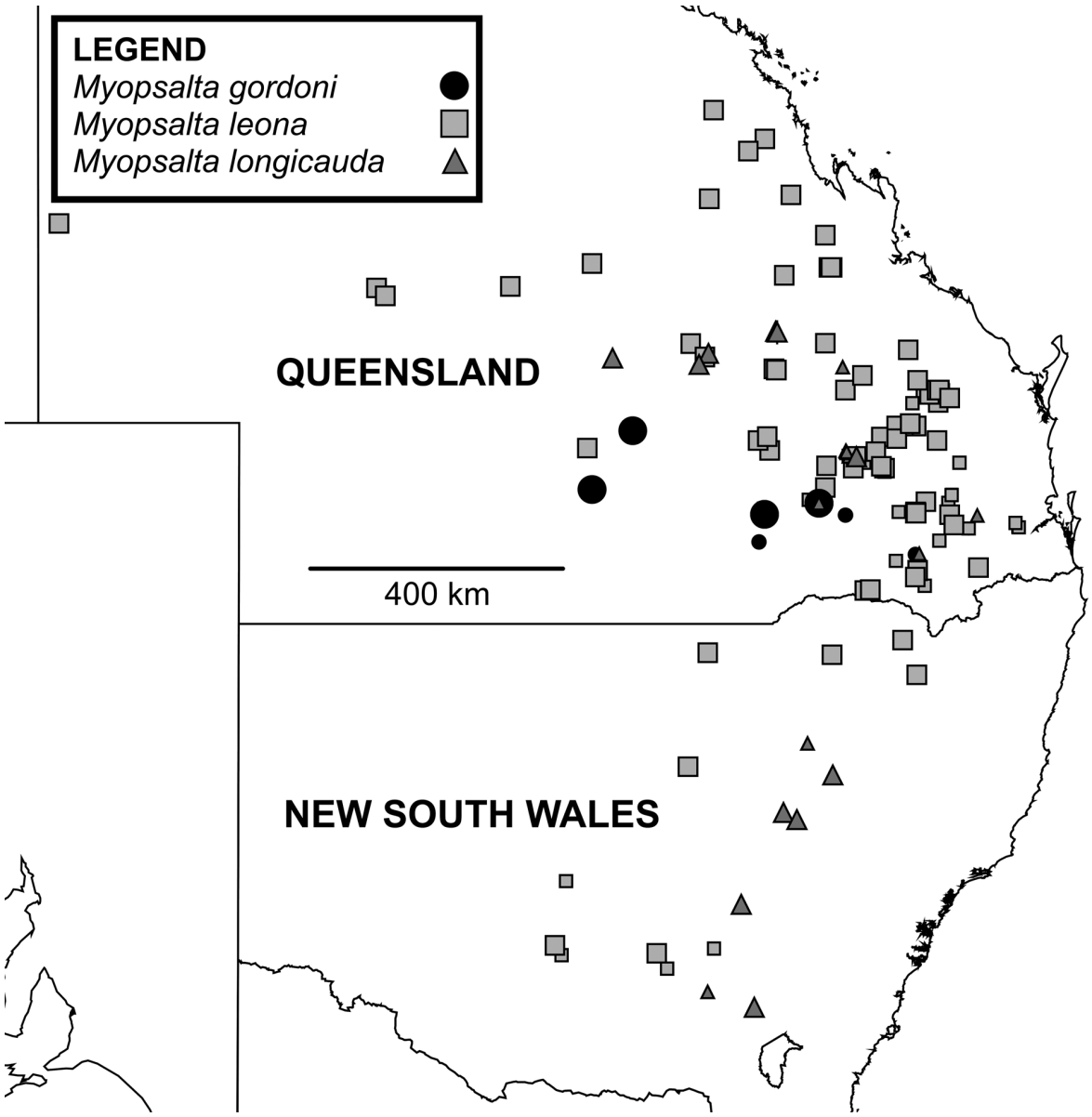

FIGURE 11. Map of mainland eastern Australia showing the geographical distributions of *Myopsalta gordoni* **n. sp.** in Queensland, *M. leona* **n. sp.** in Queensland, New South Wales and the Northern Territory and *M. longicauda* **n. sp.** in Queensland and New South Wales. Large symbols represent specimen records and smaller symbols denote audio recordings or aural observations.

Measurements. N=4♂ 7♀. Ranges and means (in parentheses), mm; BL: ♂ 10.9–12.2 (11.7); ♀ 16.6–18.9 (17.5). FWL: ♂ 13.8–14.5 (14.1); ♀ 15.8–17.6 (14.1). HW: ♂ 3.6–3.9 (3.8); ♀ 4.1–4.4 (4.2). PW: ♂ 3.5–3.8 (3.6); ♀ 3.9–4.5 (4.2). AW: ♂ 3.7–3.9 (3.8); ♀ 3.8–4.5 (4.1). FWL/W: ♂ 2.80–2.95 (2.90); ♀ 2.81–3.07 (2.96). OL: ♀ 8.4–10.2 (9.2).

Morphological distinguishing features. *Myopsalta gordoni* **n. sp.** can be distinguished from all other species in the genus apart from *M. atrata*, *M. binotata*, *M. chrysopedia* **n. sp.**, *M. coolahensis*, *M. lactea*, *M. libritor*, *M. parvula* **n. sp.**, *M. waterhousei* and *M. xerograsidia* **n. sp.** by the colour of the basal membranes of the fore wings, which is mainly white to pale grey (cf. pale brown or pale orange). It can be distinguished from *M. binotata*, *M. coolahensis*, *M. lactea*, *M. libritor* and *M. waterhousei* by having completely hyaline fore wings (including the basal cells). Males can be separated from *M. atrata* by the colouration of the posterior margins of the tergites, which are pale brown rather than orange. They can be differentiated from the similar *M. xerograsidia* **n. sp.** by the colour of sternite VII, which is uniformly dark brown to black (cf. dark brown centrally with contrasting pale brown margins in *M. xerograsidia* **n. sp.**). They can be separated from *M. parvula* **n. sp.** by the colouration of the

lateral halves of sternites III and IV, which is predominantly pale reddish-brown rather than almost exclusively dark brown. In addition, they can be distinguished from *M. chrysopedia* **n. sp.** by having a head width <4.6 mm. Females can be separated from *M. atrata* and *M. chrysopedia* **n. sp.** by the exceptionally long ovipositor sheath, which extends 3.0–3.5 mm beyond the termination of abdominal segment 9 (cf. <0.5 mm in *M. atrata* and ~2.0 mm in *M. chrysopedia* **n. sp.**). They can be distinguished from the closely similar *M. xerograsidia* **n. sp.** by the colouration of the lateral edges of the sternites, which is reddish-brown rather than pale brown.

Distribution, habitat and behaviour (Fig. 11). *Myopsalta gordoni* **n. sp.** is restricted to southern inland Queensland from the Charleville area east to near Glenmorgan. There is also an aural record from Western Creek State Forest near Millmerran. Populations occur in semi-arid woodland and scrubland on sandy substrates. Adults are typically found on the outer branches and in the foliage of trees and larger shrubs. They have been encountered between December and February. Males sing during warm, sunny conditions.

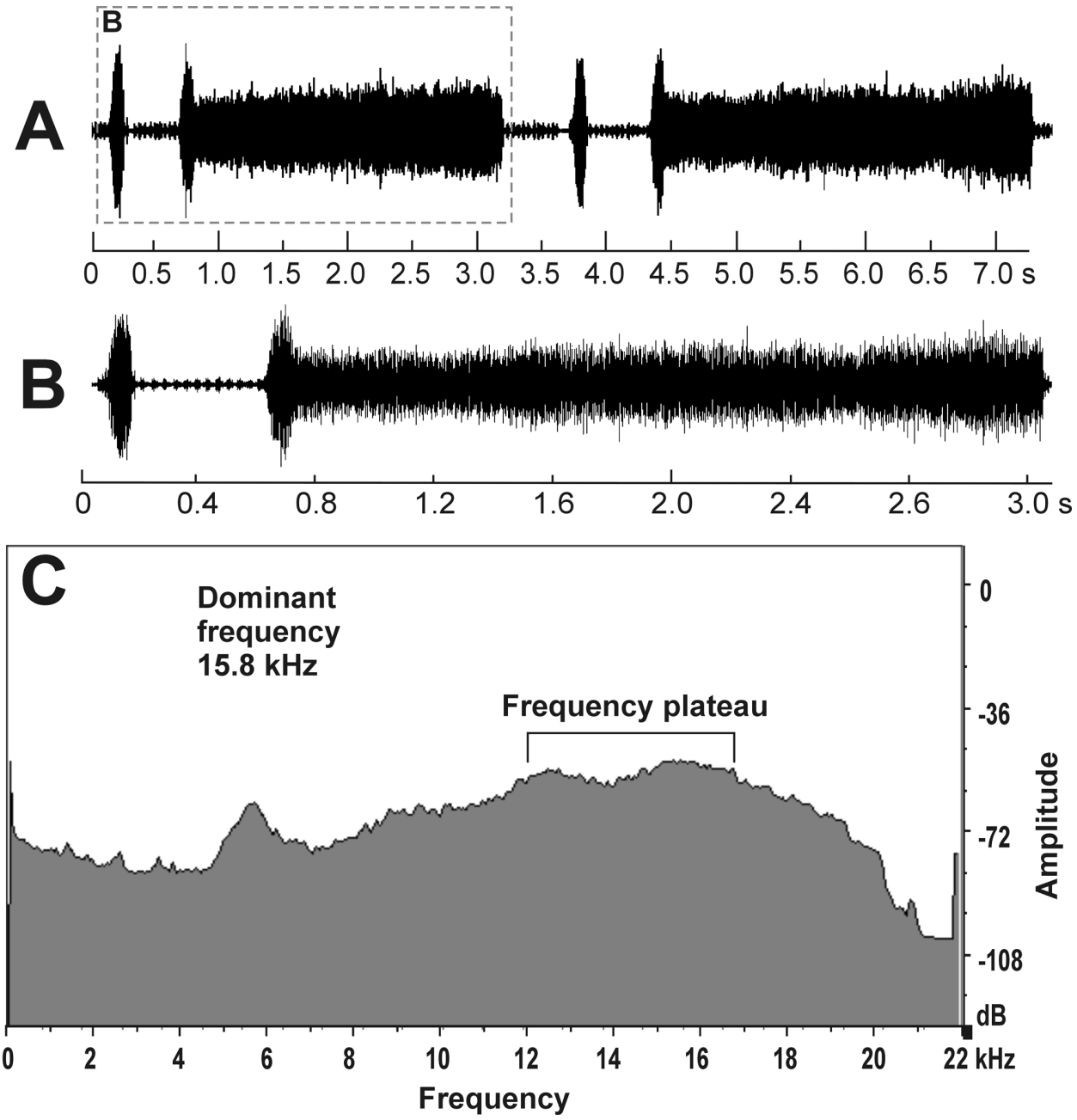

FIGURE 12. Male calling song structure of *Myopsalta gordoni* **n. sp.** from a recording obtained at Myall Park (27°12'S 149°39'E) by the author using RS2 (see Methods). (A) Wave plot illustrating two examples of a short echeme followed by a long echeme. (B) Expanded wave plot showing the more detailed structure of a short echeme followed by a long echeme. (C) Spectrogram showing the highest amplitude frequency plateau and dominant frequency.

Calling song (Fig. 12). A single recording has been obtained for this species (from Myall Park near Glenmorgan). The calling song contains regular long echemes (2.036–2.086 s duration), which are sometimes separated with at least one or two short echemes (each 0.055–0.097 s duration). The long and short echemes are separated by gaps of 0.362–0.726 s duration. Notably, the short echemes and the initial 0.087–0.101 s of the long echeme are produced at the same amplitude. However, the remainder of the long echeme drops abruptly in amplitude to one half to two thirds of the amplitude, as shown in Figure 12. Whilst the song contains apparent modulation it amplitude, it maintains a constant frequency plateau, which spans approximately 12.1–16.6 kHz.

It is anticipated that the female would produce a wing-flick response in the gaps after each short echeme; however no observations male-female courtship behaviour have been made for this species.

Myopsalta leona n. sp.

(Figs 1F, 2F, 3K, 3L, 11, 13, 14; Plate 6)

Notopsalta sp. nr *atrata* Black Brigalow Buzzer: Popple & Strange, 2002: 21, 22, 25, 29, Figs 3B, 6E, Table 1.
Notopsalta sp. G Black Brigalow Buzzer; no. 282: Ewart, 2009: 141, 145, 160, 166, Fig. 1, Fig. 8, Fig. 14D.
Myopsalta sp. nr *atrata* Black Brigalow Buzzer (Popple & Strange, 2002): Sanborn, 2014: 583.
Myopsalta sp. G (Ewart, 2009): Sanborn, 2014: 584.

Types. **Holotype**: ♂ Australia, Queensland, 4 km W. of Binjour, 25.i.2003, L. & W. Popple, Recorded, L. W. Popple, 282-0001, QM Reg. No. T239567 **(QM)**; **Paratypes**: QUEENSLAND: 1♀ Edungalba, 23°43'26"S 149°52'38"E, 12.i.2007, M. Batley (**AM**); 2♀ 26.43[°]S 146.08[°]E, 35 km SSW of Charleville Q, 13 Mar 1990, E.D. Edwards, J. H. Fisk (**ANIC**); 1♂ 1♀ Dalby, xii.1933, N. Geary; 1♀ Eidsvold Caravan Park, 25°22'06"S 151°07'25"E, 27–29.xii.2004, L. W. Popple, mercury vapour lamp, 282-0026; 5♀ 7 km NNE of Mt Bluffkin, 22°36'S 149°14'E, 160 m, on road, 16.xii.1999–22.iii.2000, Monteith, flight intercept, brigalow, 9230; 1♀ Koy Property at Brigooda (top site), 26°16'S 151°25'E, 26.i.–20.iv.1995, G.B. Monteith, flight intercept, vine scrub; 1♀ 5 km N of Allies Creek, 26°03'S 151°06'E, 360 m,11.x–11.xii.2001, G. B. Monteith, flight intercept, vine scrub, 10252; 4♀ 3 km S of Pine Mt, 21°46'S 148°51'E, 230 m, 17.xii.1999–24.iii.2000, Monteith, flight intercept, vine scrub, 9242; 2♀ Brigalow Research Station site 3, 24°49'S 149°45'E, 160 m, 28.x–16.xii.2000, D. Cook & G. Monteith, flight intercept, belah–brigalow, 9813; 1♀ Brigalow Research Station site 2, 24°49'S 149°45'E, 170 m, 28.x–16.xii.2000, D. Cook & G. Monteith, flight intercept, vine scrub, 9811; 2♂ 3♀ Nipping Gully, site 6, 25°42'S 151°26'E, 200 m, G. Monteith, C. Gough & G. Maywald, 7532; 2♂ Hurdle Gully, 14.8 km WSW of Monto, 24°55'S 150°59'E, 460 m, 19.xii.1997, Evans, Burwell & Ewart, MV lamp, open forest; 2♀ 23 km NNE of Barakula, 26°13'S 150°35'E, 400 m, 18.xii.2001–4.iii.2002, Monteith & Cook, flight intercept, brigalow, 10423; 1♀ same data as previous, G. Monteith, D. Cook & S. Wright, brigalow, 10313; 1♂ Barakula, 26°26'S 150°31'E, 26°26'S 150°31'E, 330 m, 17–18.xii.2001, G. Monteith & S. Wright, MV lamp, 10311; 3♂ 1♀ Boomer Range, site 3, 23°12'S 149°45'E, 21.iii.2000, G.B. & S.R. Monteith, MV lamp, 9266; 1♀ 3 km NNE of Mt Bassett, 26°25'S 148°55'E, 520 m, 13.xii.2001–5.iii.2002, Monteith & Cook, flight intercept, vine scrub, 10409; 1♀ same data as previous, 500 m, Monteith, Cook & Wright, 10484; 1♂ Boggomoss No. 10 via Taroom, 25°31'S 150°03'E, 14.xi.1996, D. Cook, MV lamp, 065, QM Reg. No. T32746; Yuleba State Forest, site 2, 26°58'S 149°45'E, 270 m, 8.iii.2002, Monteith & Wright, MV lamp, belah, 10497; 1♀ 10 km ENE of Wonga Hills, 26°03'S 150°55'E, 11.xii.2001, S.G. Wright, 50957; 4♀ Wonga Hills, site 1, 26°04'S 150°49'E, 480 m, 11.x–11.xii.2001, Monteith & Cook, flight intercept, vine scrub, 10242; 1♀ same data as previous, 11.xii.2001–4.iii.2002, 10397; 1♀ Wonga Hills, site 3, 26°04'S 150°49'E, 520 m, 10.x–11.xii.2001, Monteith & Cook, flight intercept, vine scrub, 10246; 1♂ 2♀ same data as previous, 11.xii.2001, Monteith, Cook & Wright, mercury vapour lamp, vine scrub; 2♀ Wonga Hills, site 4, 26°03'S 150°49'E, 470 m, 11.xii.2001–4.iii.2002, Monteith & Cook, flight intercept, brigalow, 10403; 3♂ 1♀, Gubberamunda State Forest, site 1, 26°16'S 148°45'E, 380 m, 12–14.xii.2001, Monteith & Wright, MV lamp, Cypress, 10270; 2♂ Lords Table plateau, site 2, 22°39.5'S 148°01.0'E, 640 m, 10.i–7.iii.2006, C.J. Burwell, malaise, eucalypt woodland, 133642; 1♂ 5 km NW of Charleville, 26°23'S 146°12'E, 310 m, 3–5.iii.2003, G. Monteith, C. Burwell, mulga, 51123; 2♂ Ranger's Headquarters, Mt Moffatt National Park, 25°01'S 147°57'E, 1.xii.1997, S. Evans, C. Lambkin, J. Skevington, MV lamp; 2♂ 4♀ Expedition Range National Park, 'Amphitheatre' campsite, 25°12'S 148°59'E, 560 m, 17.xii.1997, Burwell, Evans & Ewart, MV lamp, open forest; 1♂ same data as previous, 18.xii.1997, Evans & Burwell; 1♂ Expedition Range National Park, 'Amphitheatre'

yards, 25°13'S 149°01'E, 440 m, 19.xii.1997–4.iii.1998, Cook & Monteith, flight intercept, open forest; 3♂ Lake Broadwater via Dalby, 23.ii.1986, G.B. Monteith & G. Thompson, MV lamp, gravel ridge; 1♀ Lakeview, nr Lake Broadwater via Dalby, 9.ii.1986, M. Bennie; 1♀ Carnarvon Station (CN2M1), 24.82°S 147.742°E, 757 m, 24.xi–13.xii.2010, C. Zwick, malaise, brigalow/grassy hill, 19419; 1♂ Gayndah, 1963, H.A. Rose (**QM**); 1♀ Carnarvon National Park, Mount Moffatt Section, Ranger Headquarters, 25°01'22"S 147°56'59"E, 1.xi.1997, J. Skevington, C. Lambkin, S. Evans, MV lamp; 1♂ Dulacca, 4.i.1956, L.E. Jackson (**UQIC**); 3♀ Barakula State Forest near Chinchilla, 26°14.42'S 150°48.86'E, 15.xii.1997, A. Ewart, virgin brigalow; 6♂ 6♀ 'Allinga', Chinchilla, 9044/644459, 8.i.1994, brigalow; 2♂ 'Coo-ee Yards', Red Hill Road, Chinchilla, 9.i.1994; 1♂ 'Lakeview', Lake Broadwater, ~30 km SW. of Dalby, 26.i.2000, M. Bennie; 1♂ Lake Broadwater via Dalby, 27°20.42'S 151°05.65'E, 19.xii.2001, A. Ewart; 5♂ 6♀ Bringalily State Forest via Inglewood, 9.5 km NNW. of Robert Wicks Research Station, 28°12.47'S 151°07.58'E, 21.xi.2007, A. Ewart; 2♀ same data as previous, 28°12.54'S 151°07.40'E, 14.xii.2007, brigalow; 2♀ Bringalily State Forest via Inglewood, ~9.6 km NNW. of Robert Wicks Research Station, 28°12.55'S 151°07.39'E, 15.xii.2007, A. Ewart, at light, brigalow; 2♂ Bringalily State Forest via Inglewood, 6.4 km SW. of Robert Wicks Research Station, 28°18.23'S 151°05.31'E, 20.xi.2007, A. Ewart; 6♂ 6♀ Brigalow Creek, ~5 km E. of Goondiwindi, 28°30.51'S 150°20.12'E, 5.xii.2000, A. Ewart, I. Rattray; 1♂ 1km SE. of Jondaryan, 9.i.1994, open forest; 2♀ Bush Camp, Lake Broadwater Environmental Park near Dalby, 8.iii.1997, at light, wilga; 5♂ 1♀ Lake Broadwater via Dalby, 27°20.42'S 151°05.65'E, 19.xii.2001, A. Ewart; 4♀ 'Lakeview' near Lake Broadwater via Dalby, 27°20.81'S 151°04.98'E, 20.xii.2001, A. Ewart, brigalow–belah; 3♂ 14 km E. of Goondiwindi, 28°29.82'S 150°25.12'E, 4.xii.2000, A. Ewart, I. Rattray, grassland; 1♂ Nowland Property, Aubigny near Oakey, 27°31.67'S 151°40.01'E, xii.2003, J. Nowland; 1♂ L. Broadwater 30 km SW. of Dalby, 21.ii.1987 (**AE**); 2♂ Humphrey Road via Binjour, 25°33'47"S 151°27'24"E, 26.xi.2004, L. Popple & M. Finlay-Doney, 282-0004, 282-0014; 1♀ Emerald, 23.ii.2013, L. Sanders; 1♂ 1♀ Fairhill, 200 m, i.2015, L. Sanders; 2♂ 1♀ Yan Yan, 160 m, i.2016, L. Sanders; 3♂ 2♀ Gregory, 180 m, 23°26.56'S 148°32.18'E, ii.2014, L. Sanders; 3♂ 4♀ Emerald, 160 m 23°31.37'S 148°32.18'E, i.2015, L. Sanders (**DE**); 1♂ Willowvale N. of Warwick, 15.xii.2001, L. Popple & R. MacSloy, 282-0002; 1♀ Myall Park, 8 km N. of Glenmorgan, 27–28.xii.2001, L. Popple & A. Strange, mercury vapour lamp, 282-0003; 1♂ Gayndah, 27°30'S 153°01'S, 23.ii.2004, J.J. Beard, 282-0004; 14♂ Humphrey Road via Binjour, 25°33'47"S 151°27'24"E, 26.xi.2004, L. Popple & M. Finlay-Doney, 282-0005, 282-0006, 282-0008 to 282-0013, 282-0015 to 282-0019; 3♂ 3♀ Eidsvold Caravan Park, 25°22'06"S 151°07'25"E, 27–29.xii.2004, L. W. Popple, mercury vapour lamp, 282-0020 to 282-0025; 1♂ 1♀ Mundubbera district, 25°34'40"S 151°18'11"E, 28–29.xii.2004, L.W. Popple, 282-0027 & 282-0028; 1♀ NNW. of Roma, 28°12'30"E 148°42'55"E, 14.ii.2004, C. & T. Eddie, 282-0029; 2♀ Possum Park, 19 km N. of Miles, 25.xi.2005, L. W. Popple, N. Hando, open forest, 282-0031 & 282-0032; 1♀ Lake Broadwater via Dalby, 27°21'02"S 151°05'34"E, 14–15.xii.2005, L.W. Popple, mercury vapour lamp, 282-0033; 2♂ Binjour Plateau State School, Burnett Highway, 27.xi.2005, L. Popple & M. Finlay-Doney, 282-0034 to 282-0036; 1♂ Eidsvold Caravan Park, 25°22'06"S 151°07'25"E, 24–25.xi.2006, L. Popple & A McKinnon, mercury vapour lamp, 282-0037; 1♀ Possum Park, 26°30'19"S 150°12'31"E, 28.xii.2011–1.i.2012, L. Popple & A. McKinnon, mercury vapour lamp, 282-0038; 1♂ 1♀ Gregory, 23°09'S 148°24'E, ii.2014, L. Sanders, 282-0040 & 282-0041 (**LWP**); 1♀ 37 km W. of Alpha, 23°37.4'S 146°16.2'E, 12.i.2002, Cooley, Cowan, Hill, Marshall & Moulds; 1♀ Lake Broadwater nr Dalby, site A, 27°21'S 151°06'E, 24.xii.1986, G. and A. Daniels, mv lamp; 1♀ 49 km WNW. of Goondiwindi, 17.xii.1983, M.S. & B.J. Moulds; 1♂ Blackdown Tableland, Expedition Range, 9.i.1976, G. Daniels; 1♂ 1♀ 3 km E. of Mourangee Hsd, nr Edungalba, 28.i.1991, E.E. Adams; 2♂ 2♀ Bee Ck, 25 km SW. of Nebo, 6.ii.1981, M.S. & B.J. Moulds; 1♂ Dogwood R. x-ing, 30 km W. of Condamine, 18.xii.1987, M.S. & B.J. Moulds; 1♂ 1.5 km W. of 'Mourangee' Hsd, nr Edungalba, on bushes, 17.iii.1983, E.E Adams; 3♂ 'Hickleton' Stn SW. of Longreach, 23°59'19"S 143°03'17"E, 21.iii.2003, A.J. Emmott, R. & V. Ballard; 1♂ Noonbah Stn SW. of Longreach, 24°04'S 143°11'E, 10.iii.2003, P. Kleinschmidt; 2♂ 2.5 km E. of Mourangee Hsd, nr Edungalba, 18.iii.1988, E.E. Adams; 1♂ 10 km N. of Glenden Mining township, 21°20'S 148°05'E, 16.i.1987, M.S. & B. J. Moulds (**MSM**); NEW SOUTH WALES: 1♀ 31.31[°]S 146.06[°]E, 23km E. by S. of Cobar NSW, 3.xii.1981, J. C. Cardale (**ANIC**); 2♂ 1♀ Wyalong Rest Area, 33°55.33'S 147°14.58'E, 19.xi.10, Popple & Emery; 1♂ 20 km N. Goolgowi, 21.x.2015, S. Travers; 1♀ 30 km E. Goolgowi, 33°53.40'S 146°01.57'E, 19.xi.2010, Popple & Emery (**DE**); 1♀ Wyalong Centenary Park, 33°55'27"S 147°13'59"E, 21.xi.2010, L.W. Popple & D. Emery, 282-0038 (**LWP**); 2♂ Lightning Ridge, 1km E., 6.xii.2000, Noel J. Starick (**NS**); 1♂ Wallangra, 17.xii.1983, M.S. & B.J. Moulds; 1♂ Inverell, 16.xii.1983, M.S. & B.J. Moulds; 1♀ 67 km NE. of Nyngan, 27.x.1978, K.J. Lambkin & D.R. Smith; 1♀ Moree, 15.x.1971, J. Simpson (**MSM**).

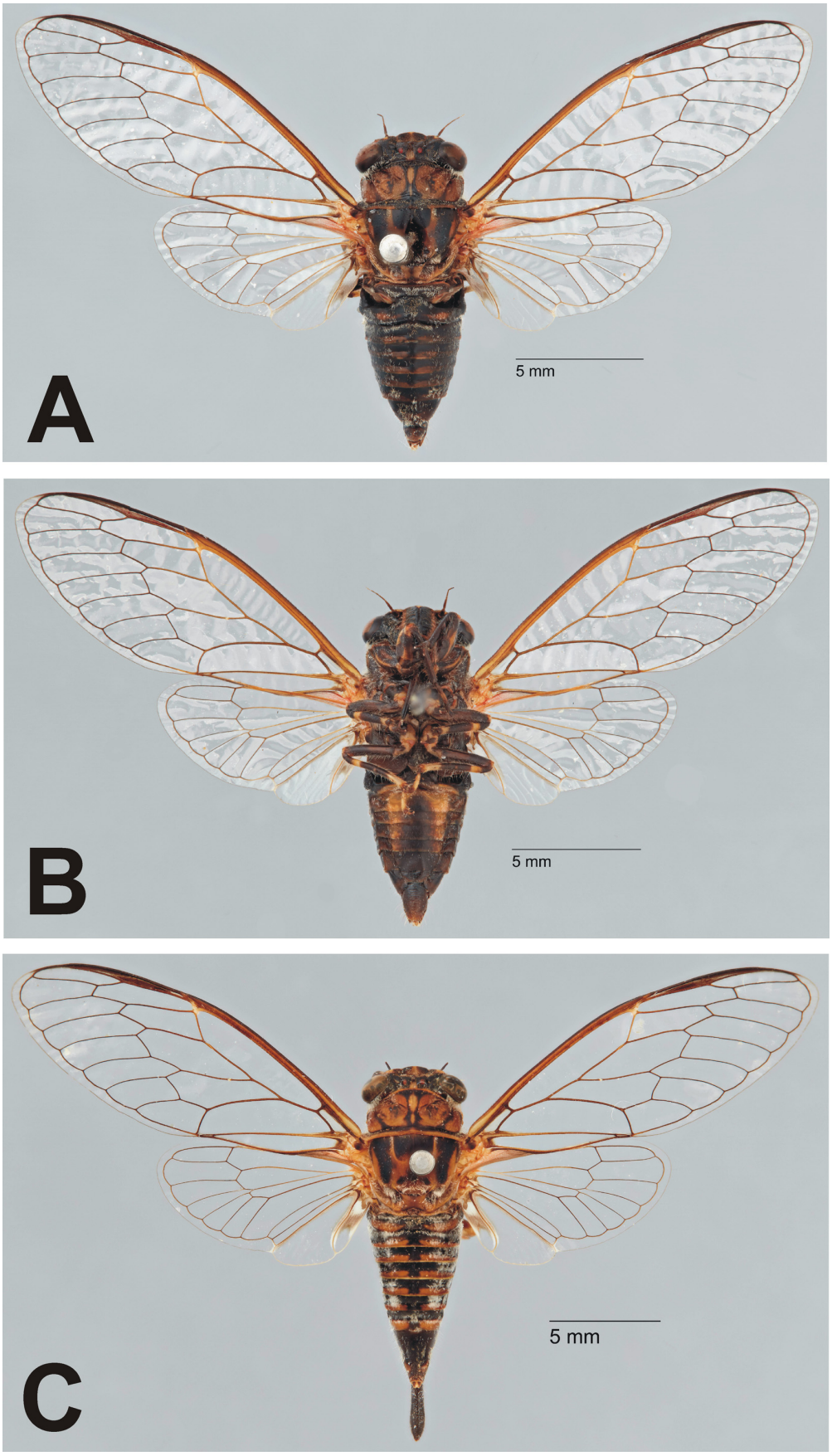

PLATE 6. *Myopsalta leona* **n. sp.**: (A) male holotype, 4 km W. of Binjour (25°32'S 151°26'E), dorsal view; (B) male holotype, ventral view; (C) female paratype, Eidsvold (25°22'S 151°08'E), dorsal view.

Etymology. The name is derived from the Latin word for Lion (presented as a noun in apposition). This refers to the striking modulation in amplitude during each phrase of the calling song. In the output of a bat detector, this modulation resembles the roar of a lion.

Description. Male. (Figs 1F, 2F, 3K, 3L; Plates 6A, 6B).

Head: Postclypeus predominantly black, brown to ochraceous along lateral and ventral margins and with a pale brown area medially on dorsal side; supra-antennal plates black, brown dorso-laterally; genae black; mandibular plates black, covered by silvery pubescence; frons black; vertex black with a brown area extending along epicranial suture from between lateral ocelli to posterior margin; vertex and frons with sparse silvery pubescence; ocelli pale red; compound eyes brown; anteclypeus black; rostrum dark brown, black apically, clearly extending to anterior margins of hind coxae; antennae dark brown to black.

Thorax: Pronotum brown; central fascia pale brown to olive-brown, surrounded with black colouration, which broadens towards anterior and posterior pronotal margins; with irregular dark brown to black patches near paramedian and lateral fissures, and narrow black areas along lateral margins; pronotal collar black, with brown to dark brown dorso-lateral posterior margins; metanotum dark brown to black; mesonotum including submedian and lateral sigilla, black, with brown areas between the submedian and lateral sigilla extending on to arms and lateral sides of cruciform elevation and posterior half of wing grooves; posterior third of mesonotum with dense fine and mid-dense long silver pubescence.

Wings: Fore wings hyaline; basal membranes orange to pale orange-brown; pterostigmata reddish-brown; extreme proximal edge of clavi sometimes partly opaque, pale brown to dark brown; veins, including costal vein, brown to dark brown, darker distally. Hind wing plagas white at base, grading to pale grey along basal two thirds, this colour extending along jugal folds and terminating before apices, hyaline over remainder; veins pale brown basally, dark brown on distal half.

Legs: Fore coxae dark brown, with longitudinal brown areas on medial anterior and posterior sides, pale brown apically; mid and hind coxae dark brown, brown on inner sides, pale brown with patches of pale orange apically; meracantha spikes dark brown, becoming pale brown apically, overlapping opercula; fore femora dark brown with pale brown longitudinal areas on outer anterior sides, pale brown to pale orange apically; mid femora dark brown with pale brown apices; hind femora dark brown; fore tibiae dark brown; mid and hind tibiae dark brown, each with two pale brown bands, one above base, other towards apex; fore and mid tarsi dark brown, brown to pale brown medially; hind tarsi pale brown; pretarsi and claws brown.

Opercula (Fig. 1F): Broadly rounded; typically dark brown to brown throughout, sometimes darker basally; plates undulating, medial areas weakly depressed.

Timbals (Fig. 2F): Anterior rib 5 abbreviated; rib 4 also abbreviated, with a prominent isolated remnant extension ventrally; ribs 1 and 2 joined ventrally and fused dorsally to basal spur; anterior termination of basal spur fused with ribs 3–4, with rib 5 unattached; prominent intercalary short ribs in medial areas between ribs 1 and 2, 2 and 3, and 3 and 4 (three in total).

Abdomen: Tergite 1 black; tergite 2 wider along dorsal midline than tergites 3 to 7; tergites 2 to 7 black, with brown areas on dorso-lateral posterior halves extending to posterior margins, all with dense short silver pubescence on dorso-lateral sides and with extensive long and short silver pubescence on lateral sides; tergite 8 black, dark dark brown on posterior half of lateral sides, covered in short silver pubescence; intersegmental membranes pale brown; epipleurites dark brown, with sparse silver pubescence; sternite II black laterally, pale brown to pale reddish-brown ventro-laterally, with a dark brown area medially; sternites III to VI pale brown to pale reddish-brown laterally, with dark brown areas medially, which broaden posteriorly, gradually increasing in size distally in each successive sternite; sternite VII dark brown to black, sometimes with diffuse brown to reddish-brown areas at extreme anterio-lateral margins; sternite VIII dark brown to black; anterior sternites visible in lateral view.

Genitalia (Figs 3K, L): Pygofer brown to dark brown; upper lobes in ventral view relatively linear, with terminals directed dorsally and apically acute; basal lobes in ventral view relatively linear, in lateral view gradually curved, subtly expressed; median lobe of uncus rounded, protruding; claspers in ventral view conspicuous, diverging markedly from point of downward deflection, with sharply developed apices; pseudoparameres projecting further (ventrally) than endotheca and ventral support; ventral support acute, projecting slightly beyond endotheca; endotheca fleshy.

Female (Plate 6C): Head, thorax, wings and legs match description of male.

Abdomen: Tergite 1 black; tergites 2 to 8 black, with broad brown to orange-brown areas on posterior dorso-

lateral and submedial sides, being most extensive on tergite 2; auditory capsules black; abdominal segment 9 dark brown to black, brown to orange brown on posterior third of dorso-lateral sides, dirty pale brown ventrally; dorsal beak black, sharply defined; sternite II pale brown to pale reddish-brown, black laterally and medially; epipleurites dark brown to black; sternites III to VI pale brown to pale reddish-brown with broad black areas medially, broadening posteriorly, typically similar in width, though often widest on sternite IV; sternite VII pale brown to pale reddish-brown with short, oblique, darker longitudinal markings medially; ovipositor sheath extends approximately 2.5–3.0 mm beyond termination of abdominal segment 9.

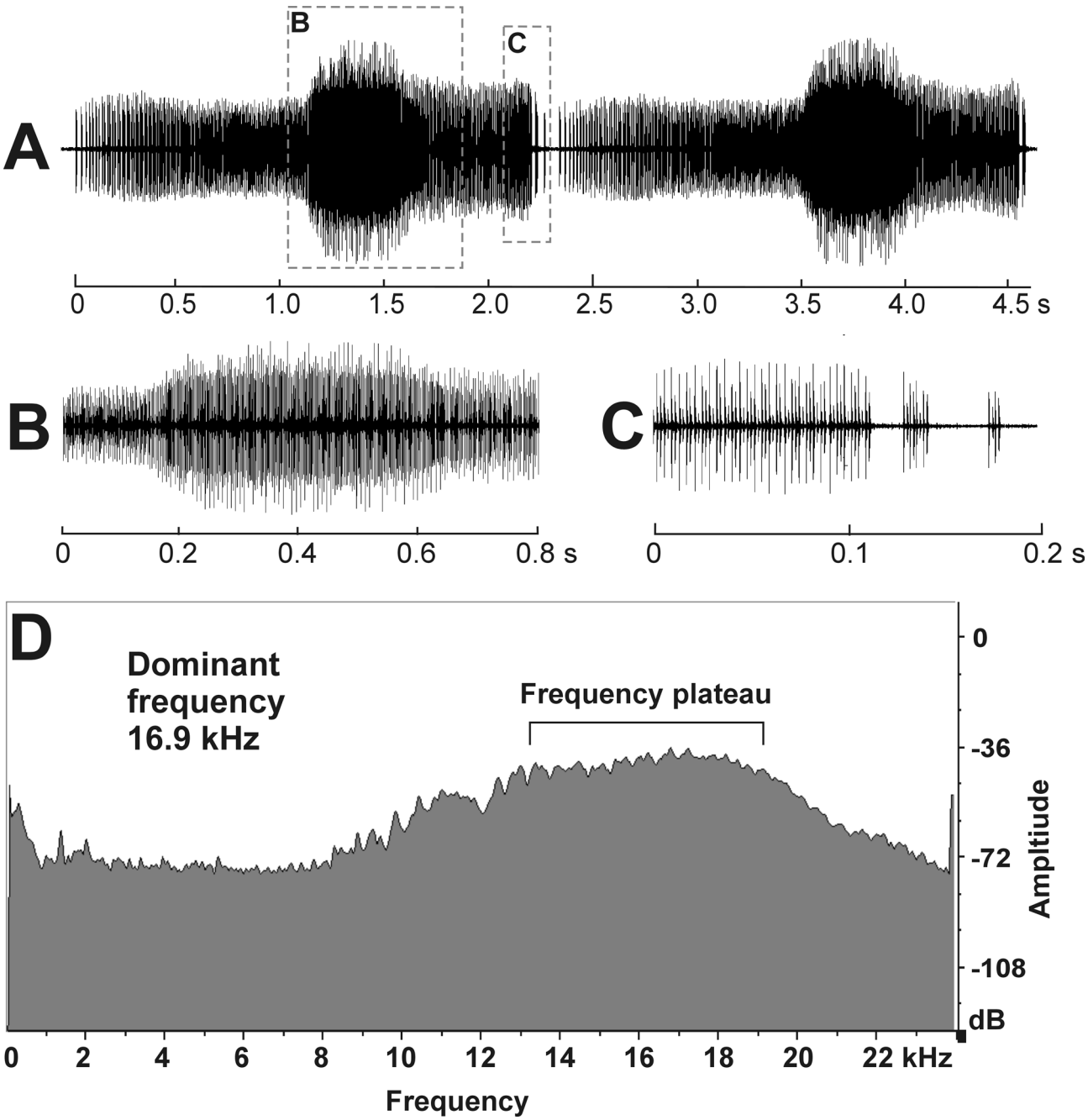

FIGURE 13. Male calling song structure of *Myopsalta leona* **n. sp.** from a recording obtained at Eidsvold (25°22'S 151°08'E) by the author using RS1 (see Methods). (A) Wave plot of two complete phrases, each containing a long echeme with characteristic amplitude modulation followed by a macrosyllable and in the initial case an additional syllable. (B) Expanded wave plot showing the detailed structure of the maximum amplitude component of the long echeme. (C) Expanded wave plot showing the detailed structure of the end of the long echeme followed by a macrosyllable and additional syllable. (D) Spectrogram showing the highest amplitude frequency plateau and dominant frequency.

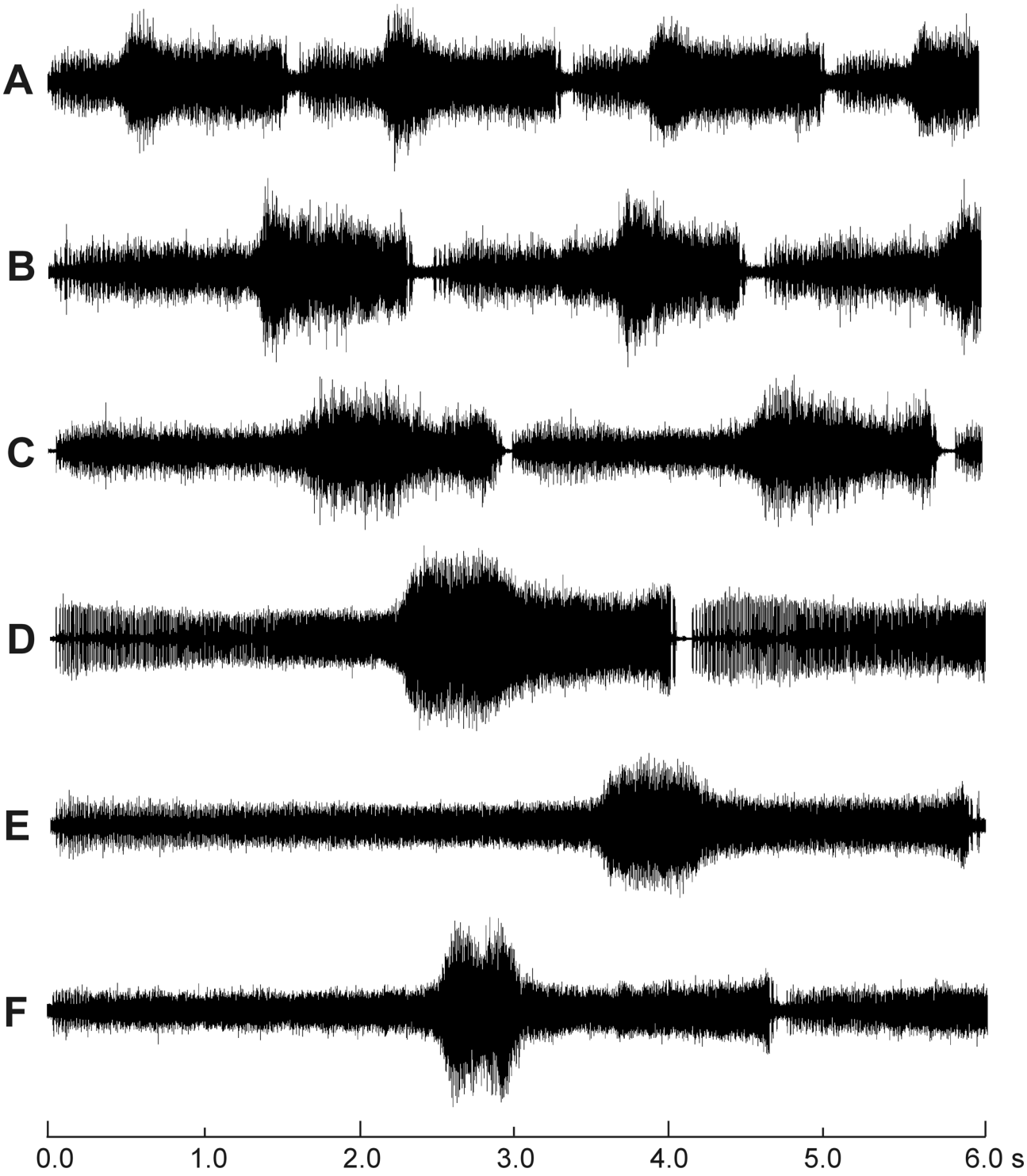

FIGURE 14. Wave plots illustrating the calling song of *Myopsalta leona* **n. sp.** from six different locations, including (A) Cravens Peak (23°10'S 138°14'E), (B) 4 km W. of Binjour (25°32'S 151°26'E), (C) Kindon (28°05'S 150°44'E), (D) Willowvale (28°11'S 152°03'E), (E) Wyalong (33°55'S 147°14'E), and (F) 9 km NW. of Grenfell (33°51'S 148°05'E). Recordings were obtained by A. Ewart using RS3 (A), and the author using RS2 (B, C, D) and RS5 (E, F) (see Methods).

Measurements. N=15♂15♀. Ranges and means (in parentheses), mm; BL: ♂ 14.3–16.7 (13.2); ♀ 13.1–18.3 (16.0). FWL: ♂ 14.3–16.7 (16.0); ♀ 14.5–18.3 (16.8). HW: ♂ 4.0–4.4 (4.5); ♀ 3.5–4.6 (4.3). PW: ♂ 3.8–4.4 (4.2); ♀ 3.7–4.8 (4.3). AW: ♂ 3.8–4.6 (4.3); ♀ 3.5–4.8 (4.1). FWL/W: ♂ 2.65–2.98 (2.85); ♀ 2.73–2.97 (2.85). OL: ♀ 5.8–8.0 (7.3).

Morphological distinguishing features. *Myopsalta leona* **n. sp.** can be distinguished from *M. atrata*, *M.*

binotata, *M. coolahensis*, *M. gordoni* **n. sp.**, *M. lactea*, *M. libritor*, *M. waterhousei* and *M. xerograsidia* **n. sp.** by the colour of the basal membranes of the fore wings, which is pale brown or pale orange rather than white to pale grey. It can be distinguished from *M. melanobasis* **n. sp.** and *M. platyptera* **n. sp.** by the appearance of the distal corner of the fore wing basal cell (adjacent to the costa and radial cell), which is entirely hyaline and not partly translucent. Males and females can be separated from *M. albiventris* **n. sp.** and *M. wollomombii* by the colouration of the sternites, which is predominantly dark brown (cf. almost entirely pale brown). They can be differentiated from *M. umbra* **n. sp.** by the colour of the costal veins, which is brown rather than reddish-brown. Males can be distinguished from *M. septa* **n. sp.** and *M. crucifera* by the colouration of sternite VII, which is entirely dark brown to black (not bordered with pale brown on any margin). They can be distinguished from *M. chrysopedia* **n. sp.**, *M. longicauda* **n. sp.** and *M. majurae* **n. sp.** by having a head width of ≤4.6 mm, from *M. parvula* **n. sp.** by having broad, contrasting, pale reddish-brown lateral edges on sternite III (cf. almost entirely dark brown to black), from *M. bassiana* **n. sp.** by having fore wings ≤6.0 mm in width, and from *M. riverina* **n. sp.** by the short length of the rostrum, which does not extend beyond the mid coxae. They can be separated from the closely similar *M. mackinlayi* by the colouration of the opercula, which is dark brown to black rather than predominantly pale brown. In addition, they can be separated from by the presence of contrasting pale brown colouration on the ventro-lateral sides of sternite II. Females can be distinguished from *M. bassiana* **n. sp.**, *M. mackinlayi*, *M. longicauda* **n. sp.**, *M. parvula* **n. sp.**, *M. septa* **n. sp.** and *M. umbra* **n. sp.** by the length of the ovipositor sheath, which extends approximately 2.5–3.0 mm beyond the apex of abdominal segment 9; this length being approximately equal to the length of abdominal segment 9 (in other species the sheath extension is noticeably longer or shorter than the abdominal segment). They can be differentiated from the superficially similar *M. crucifera* by the colouration of the thorax and dorsal abdomen, which is dark brown or brown (cf. pale brown in *M. crucifera*). Finally, they can be separated from *M. chrysopedia* **n. sp.** by their smaller size (head width <4.7 mm).

Distribution, habitat and behaviour (Fig. 11). *Myopsalta leona* is found south from the tropic of Capricorn in western, southern central and inland south-eastern Queensland from the eastern edge of the Simpson Desert south-east to the Lockyer Valley west of Brisbane. It also occurs in inland New South Wales from Narrabri west to Lightning Ridge and south to Goolgowi. Populations occur in acacia-dominated woodland and shrubland, as well as dry, temperate eucalypt woodland where the adults are typically found on the branches and in the foliage of trees and larger shrubs. Adults have been encountered from October to March. They have occasionally been observed in very large numbers, spreading from vegetation on to nearby wooden power poles and fence posts.

Calling song (Figs 13, 14). The song of this species contains repetitive buzzing phrases, each with a brief inflection in amplitude and frequency towards the middle. Each phrase commences with a long echeme, typically with a duration of 2.018–3.954 s, followed by a brief gap (0.004–0.021 s) and a syllable or macrosyllable of 0.011–0.029 s duration (all statistics, n=17 recordings). Close inspection of the structure within the long echeme sometimes reveals that the beginning contains a series of discrete syllables, or alternatively it may be entirely coalesced. The inflection occurs in the long echeme, typically half way to two thirds into its overall duration. The highest point of inflection can reach up to four times the amplitude of the beginning of the echeme and may be sustained at this increased volume for up to 0.6 s. Observations indicate that the inflection is cause by a marked upward contraction of the abdomen, followed by partial relaxation. Generally, the amplitude remains slightly higher relative to the beginning of the echeme for the remainder of the echeme following the inflection.

Prior and following to the inflection, the calling song typically exhibits a highest amplitude frequency plateau between 11.2 and 18.4 kHz. This increases to 13.0–19.5 kHz, or slightly higher, during the inflection. Some geographic variation is evident in calling song, with larger specimens from central New South Wales exhibiting slightly extended long echeme (up to 5.91 s) and lower frequency plateaus (8.7–15.2 kHz before inflection and 11.4–17.0 kHz at inflection). In addition, in recordings from Cravens Peak at the western edge of the species' distribution, produce slightly shorter long echemes (1.417–1.510 s) and the inflection is produced earlier than in other examples (Fig. 14A).

***Myopsalta longicauda* n. sp.**
(Figs 1G, 2G, 3M, 3N, 11, 15, 16; Plate 7)

Notopsalta sp. A Kunzea Cicada: Popple & Strange, 2002, 30, Table 1.

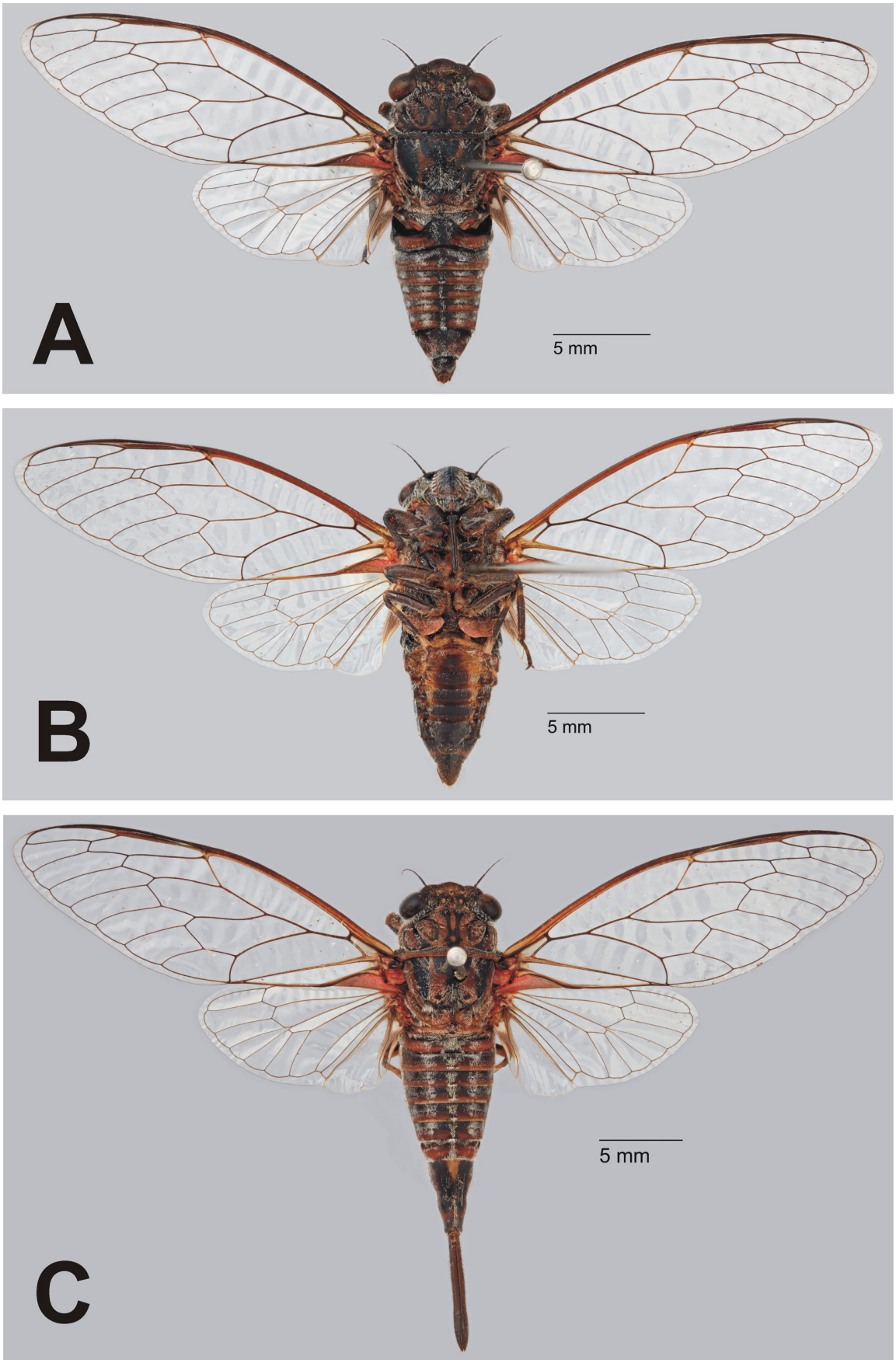

PLATE 7. *Myopsalta longicauda* **n. sp.**: (A) male holotype, Expedition Range (24°38'Sx149°00'E), dorsal view; (B) male holotype, ventral view; (C) female paratype, same locality as holotype, dorsal view.

Types. **Holotype**: ♂ QLD: 24°38'Sx149°00'E, Expedition Ra., old hwy, 6.x.2003, MV light, G.B. Monteith, 11392, QM Reg. No. T239568 **(QM)**; **Paratypes**: QUEENSLAND: 2♂ 3♀ same data as holotype (**QM**); 1♀ Carnarvon National Park, Mount Moffatt Area, 30.xi.1997, J. Skevington, C. Lambkin, S. Evans (**UQIC**); 1♂ 1.4 km NE. along West Branch Camp track, Mt Moffatt National Park, 24°57.70'S 147°59.86'E, 13.xii.2006, A. Ewart, at light; 1♀ 2.3 km SW. along West Branch Camp track, Mt Moffatt National Park, 24°57.70'S 147°59.86'E, 13.xii.2006, A. Ewart, at light (**AE**); 1♂ Australia Qld, Possum Park, 19 km N. of Miles, 25.xi.2005, L. W. Popple, N. Hando, open forest, 294-0001; 1♂ 3♀ same data as previous, mv lamp, 294-0002 to 294-0005 (**LWP**); 1♂ AU.QL.EXP, Expedition Rg. on Dawson Hwy, 24°38.658'S 149°1.292'E, 437 m, 7.i.2009, Hill Marshall, Moulds, Owen, C. Simon Lab Voucher, body pinned, legs in ETOH, 09.AU.QL.EXP.03, Notopsalta 'giant', specimen recorded; 1♂ same data as previous, 09.AU.QL.EXP.05, specimen recorded; 1♂ 2♀ 'Stockade', 60 km NE. of Augathella, 12.xii.1995, brigalow woodland, Colin Dollery (**MSM**); NEW SOUTH WALES: 2♂ 30 km N. Tooraweena, 31°15.40'S 149°51.43'E, 16.xi.2013, N. & D. Emery; 1♂ 14 km NW. Dunedoo, 31°55.238'S 149°19.050'E, 1.xii.2013, N. & D. Emery; 2♂ 50 km N. Mudgee, 32°08.25'S 149°48.11'E, 13.xi.2013, N. & D. Emery (**DE**); 1♂ 30 km N. Tooraweena, 31°15.40'S 149°51.43'E, 16.xi.2013, N. & D. Emery (**LWP**); 1♀ Mendooran, 8.xii.1973, G. Daniels; 1♂ AU.NS.BUN, 33 km E. of Parkes on Orange Rd, SW. of Bumberry, 33°11.260'S 148°29.130'E, 604 m, 13.i.2011, K. Hill, D. Marshall, C. Simon Lab Voucher, body pinned, legs in ETOH, 09.AU.NS.BUN.02, 'atrata complex slow', specimen recorded; 1♂ AU.NS.BUG, ~8.5 km SE. of Binalong on Burley Griffin Way, 34°43.336'S 148°41.067'E, 490 m, 3.i.2011, K. Hill, D. Marshall, C. Simon Lab Voucher, body pinned, legs in ETOH, 11.AU.NS.BUG.01, 'atrata complex', specimen recorded (**MSM**).

Etymology. The specific epithet is a feminine compound adjective derived from the Latin words: *longus* and *caudus*, meaning long-tailed. This refers to the exceptionally long ovipositor exhibited in female specimens.

Description. Male. (1G, 2G, 3M, 3N; Plates 7A, 7B).

Head: Postclypeus broadly brown to reddish brown along ventral and lateral margins, black medially, in dorsal view black anteriorly, grading to reddish-brown posteriorly with a pale brown marking medially, which broadens towards posterior margin; supra-antennal plates and genae black; mandibular black, brown broadly along lateral margins, with silver pubescence; vertex and frons black, with a brown marking medially, extending from between lateral ocelli to posterior margin; ocelli pink; compound dark brown; anteclypeus black; rostrum dark brown, black apically, extending beyond posterior margins of mid coxae; antennae dark brown to black.

Thorax: Pronotum reddish-brown; central fascia brown, surrounded with black colouration, which broadens along anterior pronotal margin; with irregular black patches near paramedian and lateral fissures; pronotal collar black, broadly reddish brown along medial and dorso-lateral posterior margins; metanotum dark reddish-brown; mesonotum reddish-brown, dark brown laterally; submedian and lateral sigilla broad and black; anterior cruciform elevation and interior of wing grooves, dark brown to black, reddish-brown over remainder; posterior quarter of mesonotum with dense fine and long silver pubescence.

Wings: Fore wings hyaline; basal cells orange; pterostigmata dull reddish brown; vein CuP+1A pale brown; other veins, including costal vein, brown to dark brown, darker distally. Hind wing plagas pale grey-brown along basal two thirds, this colour extending broadly along jugal folds and terminating before apex, hyaline over remainder; veins pale brown basally, brown medially, dark brown on distal third.

Legs: Fore coxae brown on anterior sides, pale brown on posterior sides, each with dark brown to black longitudinal marking posterio-laterally, pale pinkish-brown apically; mid and hind coxae brown with dark brown longitudinal markings on proximal and posterio-lateral sides, pale pinkish-brown apically around joints; meracantha spikes dark brown basally grading to pale brown apically, overlapping opercula; fore femora brown with broad dark brown longitudinal areas on proximal, lateral and posterior sides; mid femora pale brown on posterior sides, brown on anterior sides with dark brown longitudinal markings, dark brown apically; hind femora similar to mid femora though pale brown apically; fore tibiae dark brown; mid and hind tibiae dark brown, each with a pale brown band above base and another smaller band near apex; fore and mid tarsi mottled dark brown to brown; hind tarsi pale brown; pretarsi brown with dark brown apical areas; claws dark brown.

Opercula (Fig. 1G): straight-edged laterally and posterior-laterally, broadly rounded over remainder; dark brown basally, extensively pale brown over crest, sometimes with pinkish-brown intrusions; plates softly undulating, medial areas slightly depressed.

Timbals (Fig. 2G): Anterior rib 5 abbreviated; rib 4 also abbreviated, with a prominent isolated remnant extension ventrally; ribs 1 and 2 joined ventrally and fused dorsally to basal spur; anterior termination of basal spur

fused with ribs 3–4, with rib unattached; prominent intercalary short ribs in medial areas between ribs 1 and 2, 2 and 3, and 3 and 4 (three in total).

Abdomen: Tergite 1 dark reddish-brown to black; tergite 2 wider along dorsal midline than tergites 3 to 7, black with prominent orange-brown areas on dorso-lateral interior; tergites 3 to 8 black, typically with dark brown to brown areas dorso-laterally, over posterior half of each tergite, all with dense short silver pubescence on dorso-lateral sides and with extensive long and short silver pubescence on lateral sides; intersegmental membranes brown; epipleurites dark brown to reddish-brown, with sparse silver pubescence; sternite II black laterally, pale brown over remainder; sternite III a mixture of pale brown and orange-brown, with a dark brown medial marking broadening to posterior margin; sternites IV to VI dark brown with diffuse mixed pale brown and orange-brown areas laterally, decreasing in size posteriorly in each successive sternite; sternite VII dark brown to black; sternite VIII dark brown to dark reddish-brown; anterior sternites visible in lateral view.

Genitalia (Figs 3M, N): Pygofer dark reddish brown to black; upper lobes in ventral view relatively linear, with terminals directed inwards and dorsally with broadly acute apices; basal lobes in ventral view relatively linear, in lateral view broadly rounded; median lobe of uncus rounded; claspers in ventral view conspicuous, gradually diverging, with sharply developed apices; pseudoparameres projecting further (ventrally) than endotheca and ventral support; ventral support acute, projecting slightly beyond endotheca; endotheca fleshy.

Female (Plate 7C): Head, thorax, wings and legs match description of male.

Abdomen: Tergite 1 black; tergites 2 to 8 reddish-brown, with black areas along anterior half of each tergite, each extending posteriorly along centre and narrowing towards posterior margins; auditory capsules dark brown, diffuse; abdominal segment 9 reddish-brown with with black longitudinal markings on dorso-lateral sides; dorsal beak dark brown, sharply defined; sternite II dark brown to black laterally, otherwise pale brown to brown; epipleurites dark brown anteriorly, grading to pale brown over posterior half; sternites III to VI pale reddish-brown with dark brown areas medially, broadening posteriorly, typically similar in width, though often widest on sternite V; sternite VII pale reddish-brown; ovipositor sheath extends 5.1–5.5 mm beyond termination of abdominal segment 9.

Measurements. N=12♂ 9♀. Ranges and means (in parentheses), mm; BL: ♂ 14.3–19.8 (16.43); ♀ 22.5–29.3 (24.74). FWL: ♂ 18.5–21.8 (20.31); ♀ 19.7–24.9 (22.07). HW: ♂ 4.8–5.5 (5.20); ♀ 4.8–5.9 (5.38). PW: ♂ 4.7–5.7 (5.30); ♀ 4.6–6.4 (5.48). AW: ♂ 4.8–5.5 (5.28); ♀ 4.5–6.2 (5.17). FWL/W: ♂ 2.73–3.14 (2.94); ♀ 2.87–3.12 (2.98). OL: ♀ 11.9–15.6 (13.53).

Morphological distinguishing features. *Myopsalta longicauda* **n. sp.** can be distinguished from *M. atrata*, *M. binotata*, *M. coolahensis*, *M. gordoni* **n. sp.**, *M. lactea*, *M. libritor* and *M. waterhousei* and *M. xerograsidia* **n. sp.**, by the colour of the basal membranes of the fore wings, which is pale brown or pale orange rather than white to pale grey. It can be distinguished from *M. melanobasis* **n. sp.** and *M. platyptera* **n. sp.** by the appearance of the fore wing clavus, which is entirely hyaline and not opaque at the base. Males and females can be separated from *M. albiventris* **n. sp.** and *M. wollomombii* by the colouration of the sternites, which is predominantly dark brown (cf. almost entirely pale brown). They can be differentiated from *M. umbra* **n. sp.** by the colour of the costa and tergites, which is brown rather than reddish-brown. Males can be distinguished from *M. septa* **n. sp.** and *M. crucifera* by the colouration of sternite VII, which is entirely dark brown to black (not bordered with pale brown on any margin). They can be distinguished from *M. mackinlayi*, *M. leona* **n. sp.**and *M. parvula* **n. sp.**by having a head width of >4.6 mm. They can be separated from *M. chrysopedia* **sp nov.** *M. majurae* **n. sp.** and *M. riverina* **n. sp.** by having tergites that are partly brown on the lateral sides (not entirely black). In addition, they can be distinguished from the closely similar *M. bassiana* **n. sp.** in having a mixture of pale brown and orange-brown colouration on the lateral sides of sternites II–V (not only pale brown). Females can be distinguished from *M. bassiana* **n. sp.**, *M. mackinlayi*, *M. leona* **n. sp.**, *M. crucifera*, *M. parvula* **n. sp.** and *M. septa* **n. sp.** by the length of the ovipositor sheath, which extends >5.0 mm beyond the apex of abdominal segment 9.

Distribution, habitat and behaviour (Fig. 11). *Myopsalta longicauda* **n. sp.** has a wide distribution in association with soils derived from sandstone, extending from Mount Moffatt and Expedition Range in central Queensland south to near Stockingbingal and near Binalong in New South Wales. Populations inhabit eucalypt forest and woodland. Adults occur principally on the main trunks and upper branches of eucalypts. They have been found from October to January.

Calling song (Figs 15, 16). This species produces repeated phrases, each containing successive echemes with notable amplitude modulation, giving the song a 'wavering' quality. Each phrase commences with a quiet syllable sequence (each syllable 0.008–0.011 s, separated by gaps of 0.008–0.052 s, total duration 0.240–0.478 s) followed

by a series of 10–16 echemes (each 0.209–0.276 s duration), each punctuated by brief gaps (0.011–0.017 s), and then a shorter echeme (0.101–0.139 s) followed by a detectable gap (0.029–0.041) and a macrosyllable (0.015–0.027 s) (all statistics, *n*=18 recordings). A longer gap of 0.155–0.280 s duration separates each phrase. It is expected that the female would respond during the long gap at the end of each phrase, following the second shorter echeme; however this interaction has not yet been observed in this species. A characteristic of the song is that the introductory syllable sequence and initial two echemes are 2–4 times quieter than the echemes that follow.

The calling song maintains an even frequency distribution throughout, exhibiting a high amplitude plateau of 9.5–13.1 kHz, or 9.8–14.4 kHz in smaller males.

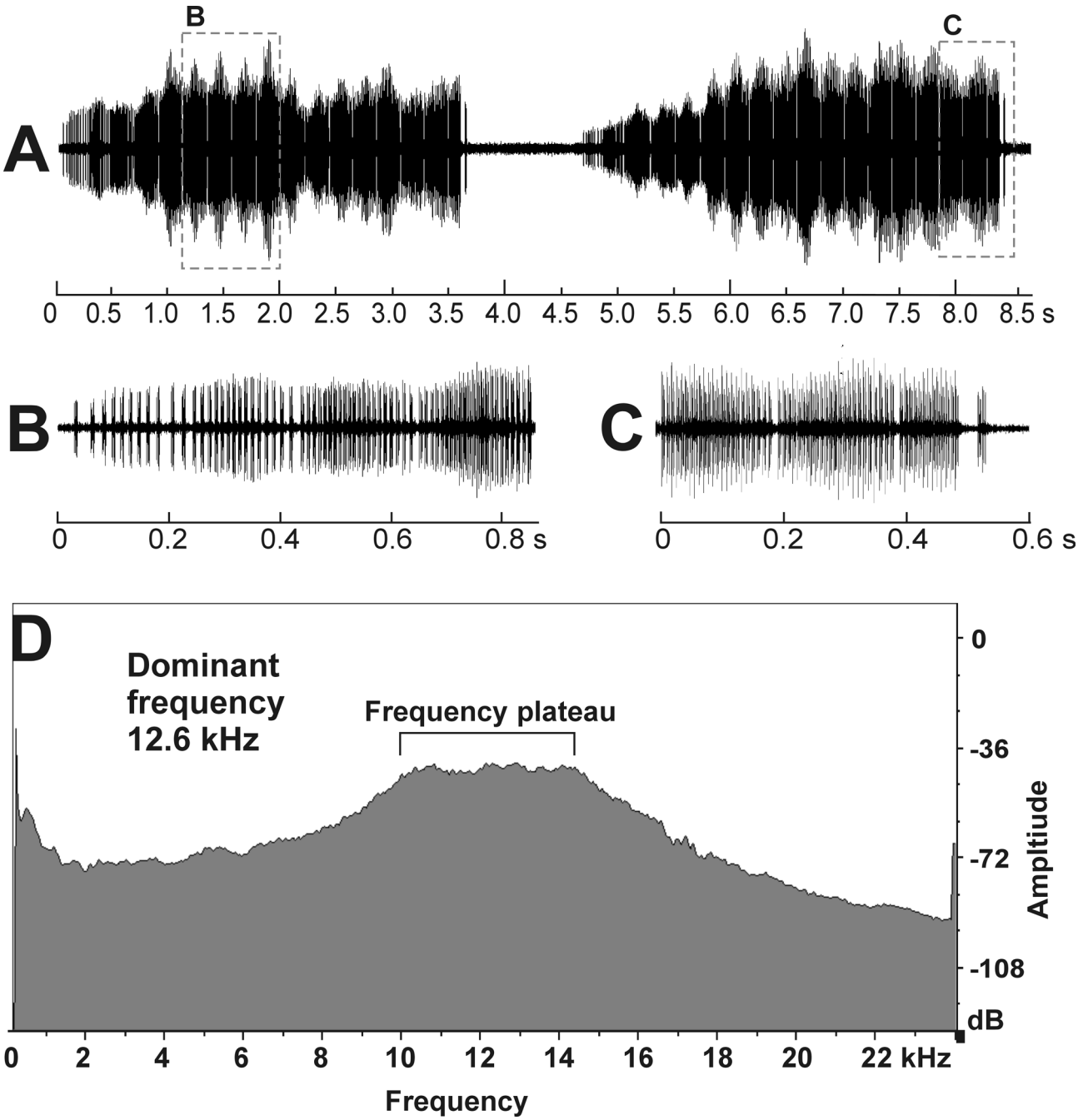

FIGURE 15. Male calling song structure of *Myopsalta longicauda* **n. sp.** from a recording obtained at Possum Park (26°30'S 150°06'E) using RS1 (see Methods). (A) Wave plot of two complete phrases, each containing a syllable sequence followed by 16 echemes and ending with a macrosyllable. (B) Expanded wave plot from the middle of a phrase showing four echemes, each revealed to contain dense sequences of non-coalesced syllables. (C) Expanded wave plot showing the structure of the end of a song phrase showing the final three echemes and the concluding macrosyllable. (D) Spectrogram showing the highest amplitude frequency plateau and dominant frequency.

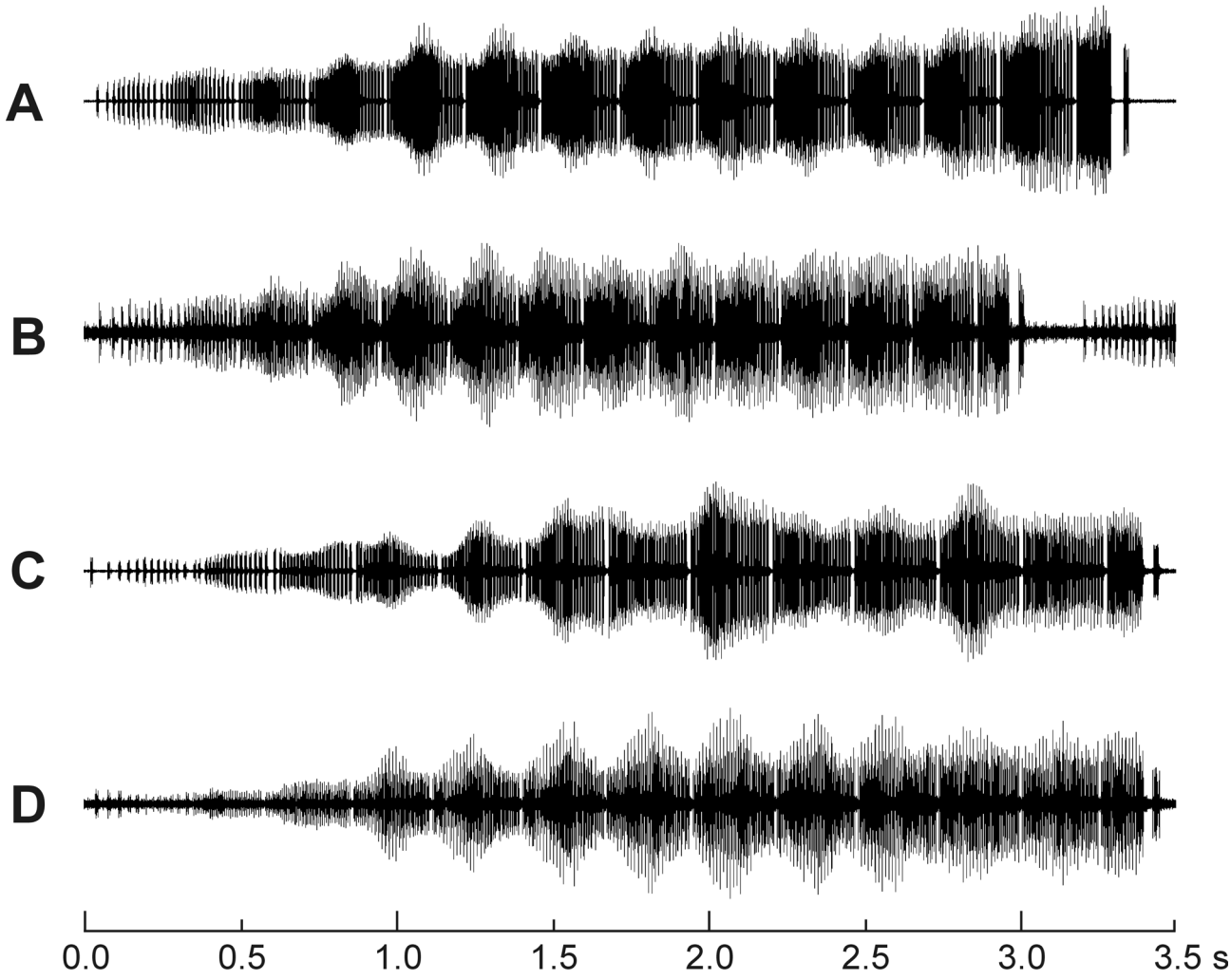

FIGURE 16. Wave plots illustrating the calling song of *Myopsalta longicauda* **n. sp.** from four different locations, including (A) Possum Park (26°30'S 150°06'E), (B) Myall Park (27°12'S 149°39'E), (C) Geham (23°23'S 152°01'E), and (D) 8 km E. of Stockinbingal (23°30'S 147°59'E). Recordings were obtained by the author using RS1 (A, C), RS2 (B) and RS5 (D) (see Methods).

Myopsalta mackinlayi **(Distant, 1882)**

(Figs 1H, 2H, 3O, 3P, 17, 18–20; Plate 8)

Melampsalta mackinlayi Distant, 1882: 130, pl. 7.
Cicadetta mackinlayi (Distant, 1882): Moulds, 1988; Moulds, 1990: 144.
Notopsalta atrata (Goding & Froggatt, 1904): Ewart, 1988: 183, 191, 194, 198, 199, Fig. 10A, Pl. 3F; Lithgow, 1988: 65; Moulds, 1990: 160, 169, Plate 19, Figs 7, 7a; Ewart, 1998a: 54–57, Fig. 1, Fig. 2; Sueur, 2001: 43, Table 1; Popple & Strange, 2002: 22, 29, Table 1; Emery *et al.* 2005: 102–107, Tables 1–3; Moulds, 2005: 395–397; Shiyake, 2007: 8, 108, 110, Fig. 189.
Myopsalta mackinlayi (Distant, 1882): Moulds, 2012: 17, 21, 24, 74, 151.
Myopsalta atrata (Going and Froggatt, 1904): Moulds, 2012: 16, 18, 19, 21, 24, 151, 152, 162.
Myopsalta nr *atrata*: Marshall *et al.*, 2016: 10, Fig. 2b.

There are three specimens labelled as syntypes of *Melampsalta mackinlayi* in the Natural History Museum, London. Examination of these specimens reveals that each now belongs to a different genus within the Cicadettini, and only one of the specimens keys to *Myopsalta*. Notably, this female specimen is the only example in the type series that bears the red 'type' label and it is also the specimen that matches the illustration provided for *M. mackinlayi* in Distant (1882). Therefore, this female specimen has been chosen as the lectotype. The remaining two

specimens are not designated as paralectotypes because one is a female of *Chelpsalta myoporae* Ewart, Popple & Marshall and the other is a male from an undescribed species in what is most likely an undescribed genus allied to *Yoyetta* Moulds. Examinations have revealed that the female lectotype of *M. mackinlayi* is conspecific with material formerly identified as *Myopsalta atrata* (as noted in the synonymy list above). A revised identity for *M. atrata* and a redescription of that species was provided by Emery *et al.* (2015b).

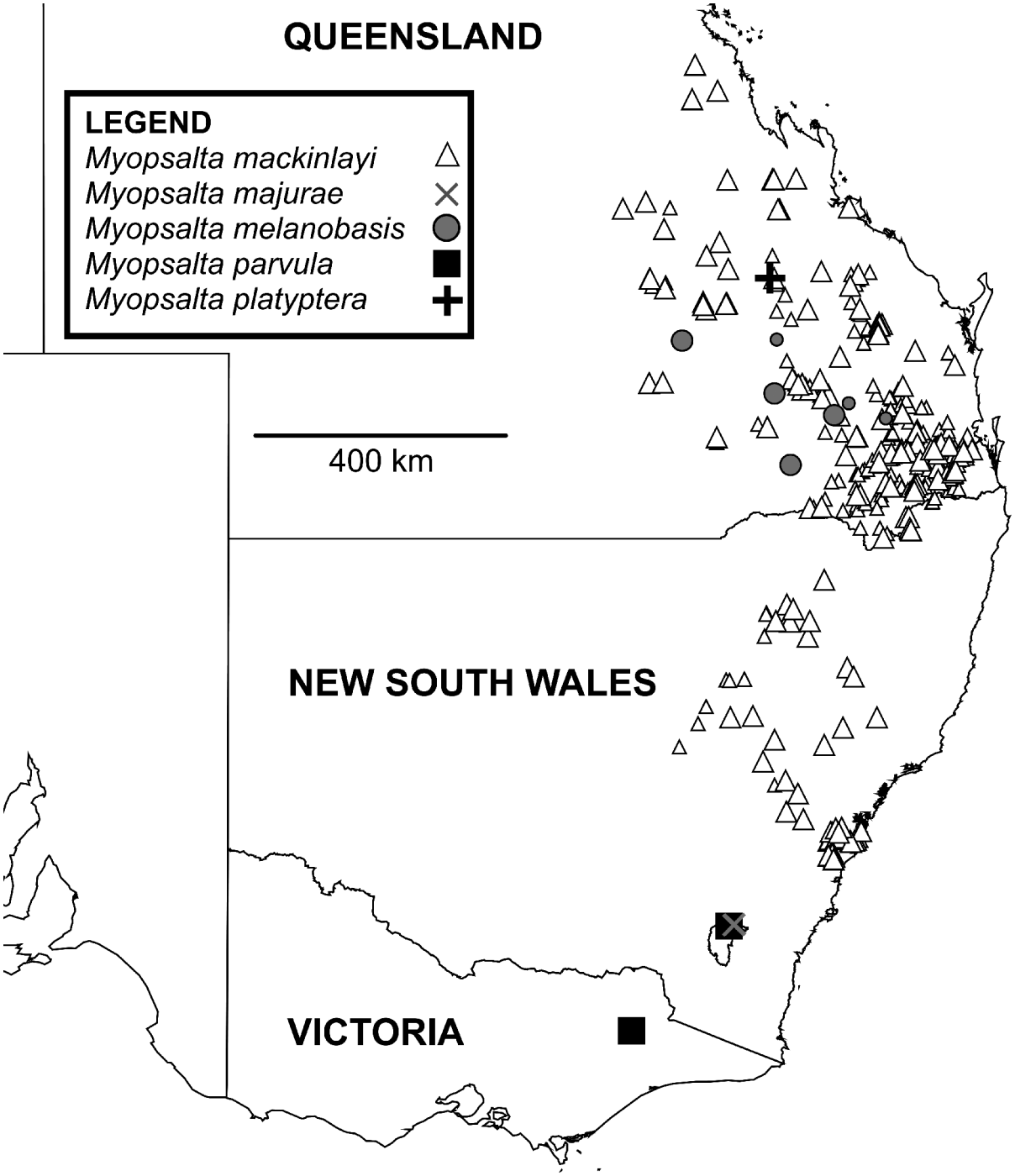

FIGURE 17. Map of mainland south-eastern Australia showing the geographical distributions of *Myopsalta mackinlayi* (Distant) in Queensland and New South Wales, *M majurae* **n. sp.** in the Australian Capital Territory, *M. melanobasis* **n. sp.** in Queensland, *M. parvula* **n. sp.** in the Australian Capital Territory and Victoria, and *M. platyptera* **n. sp.** in Queensland. Large symbols represent specimen records and smaller symbols denote audio recordings or aural observations.

Types. **Lectotype** (here designated): ♀ 'Peak Downs' [Queensland], '*mackinlayi* Dist.', 'Distant Coll. 1911–383', 'Type' [red label], 'Syn-type' [Pale blue label] (**NHM**). **Other material**. QUEENSLAND: 1♀ Toowoomba,

C. Barrett, x.1910, H. Ashton Coll., K295890; 3♂ Laidley, 19.ii.1978, W. J. Woodhead, K295891, K295893, K295894; 3♂ [poor condition] Laidley, 19.ii.1978, W. J. Woodhead; 2♂ 1♀ Carnarvon Rge, xii.1941, N. Geary (**AM**); 2♂ 5k. along Millmerran–Turallin Rd, NW. of Millmerran, 24.i.91, T.A. Lambkin; 2♂ Dunmore S.F., W. of Cecil Plains, 30.x.1980, T. A. Lambkin; 1♂ Millmerran, 4.x.1990, T.A. Lambkin; 1♂ Chinchilla, 15.ii.1990, T.A. Lambkin; 1♂ Leyburn, 1.ii.92, A.I. Knight; 1♂ Gentleman's Seat, S. of Pittsworth, 30.x.1990, T.A. Lambkin; 1♂ 5km S.E. of Meringandan, 30.xi.1990, T.A. Lambkin, ANIC Database no. 20 005608, Bold Proc. ID ANICY583-11; 4♂ 1♀ Biggenden, 4.i.1972, H. Frauca, sclphl forest; 1♀ 7 km N. of Jondaryan, 25.xii.1982, J.T. Doyen; 2♂ Ban Ban Ra. via Coalstoun Lakes, 8.i.1974, H. Frauca; 1♂ Ban Ban Ra. via Coalstoun Lakes, 7.i.1974, H. Frauca; 1♀ Lemon Tree Stn. N. of Millmerran, K.H.L. Key; 2♀ Foothills of Mt Walsh Nat. Park, 10 km SbyE. of Biggenden, 1–2.i.1972, H. Frauca; 2♂ Biggenden, Bluff Range, 13.i.1972, H. Frauca; 1♂ Ban Ban Ra. via Coalstoun Lakes, 5.ii.1975, H. Frauca; 1♂ Cunningham's Gap Nat. Pk, 4km W. of summit, 27–28.xi.1982, J. Doyen coll. (**ANIC**);1♀ 'Lakeview', Lake Broadwater SW. of Dalby, 8.xii.2000, M. Bennie. 27°21.08'S 151°05.43'E, previously designated as a paratype of *Chelapsalta myoporae* Ewart *et al.*, 2015b; 1♂ 16 km N. of Boonah, 24.xii.1990, C.J. Burwell; 2♂ same data as previous, 8.xii.1990; 1♂ same data as previous, 22.xii.1990; 2♂ 16 km N. of Boonah, 27°54'S 152°41'E, 25–26.xii.1996, C.J. Burwell; 1♂ same data as previous, 3.xii.1997; 6♂ same data as previous, 17.ix.1994; 1♂ same data as previous, 19.i.1997; 1♂ 1♀ 26°26'S 150°30'E, Barakula, 330 m, 11–17.x.2004, G.B. Monteith, mercury vapour lamp, 11672; 1♂ 7♀ Expedition Range National Park, 'Ampitheatre' campsite, 560 m, 25°12'S 148°59'E, 17.xii.1997, Burwell, Evans & Ewart, mercury vapour lamp, open forest; 1♂ 3♀ same data as previous, 18.xii.1997; 1♀ 'Wonga Hills', site 5, 26°03'S 150°50'E, 11.xii.2001, S.G. Wright; 1♀ 'Wonga Hills', site 1, 26°04'S 150°49'E, 480 m, 11.xii.2001–4.iii.2002, Monteith & Cook, vine scrub, 10397; 1♂ Nipping Gully, site 6, 25°42'S 151°26'E, 200 m, 18–19.xii.1998, G. Monteith, C. Gough & G. Maywald; 2♀, Nipping Gully, site 1, 25°42'S 151°26'E, 300 m, 16.i.2003, G.B. Monteith, mercury vapour lamp, open forest; 3♂ 1♀ Binjour Plateau, Swains Rd, 340 m, 25°32'S 152°30'E, 21.xii.1997, C.J. Burwell, S. Evans; 1♀, Nipping Gully, site 2, 25°40'S 151°26'E, 300 m, 16.i.2003, Monteith, Gough & Thompson, mercury vapour lamp, vine forest, 7461; 3♀ Boomer Range, Python Scrub, site 5, 23°12'S 149°44'E, 240 m, 16.xii.1999–22.iii.2000, Monteith, flight intercept, vine scrub, 9117; 1♂ Expedition Range NP, 'Amphitheatre', 25°13'S 148°59'E, 520 m, 18.xii.1997, Evans, Burwell & Ewart, mercury vapour lamp, vine scrub; 18♂ 24♀ Hurdle Gully, 14.8 km WSW. of Mon to, 24°55'S 150°59'E, 460 m, 19.xii.1997, Evans, Burwell & Ewart, mv lamp, open forest; 2♀ same data as previous, 21.xii.1997; 1♂ Hurdle Gully, 13.3 km WSW. of Mon to, 24°55'S 150°59'E, 390 m, 20.xii.1997, Burwell, Evans & Ewart, mercury vapour lamp; 1♀ Mt Greville base, nr Boonah, 28°03.9'S 152°30.7'E, 240 m, 28.xii.2016–5.i.2017, N. Starick, C. Lambkin, at light, 37298; 1♂ 24.8052°S 147.7546°E, Carnarvon Stn, nr Homestead, 753 m, 12.x.2014, Lambkin, Wright, J. & K. Wilson, Net, flowering herbs, 37271, *Myopsalta* sp. nr *crucifera*; 1♂ 24.8037°S 147.7545°E, Carnarvon Stn, nr Homestead, 750 m, 12.x.2014, Lambkin, Wright, J. & K. Wilson, Net, Eucalyptus woodland, 37275; 1♀ Boomer Range, site 3, 23°12'S 149°45'E, 21.iii.2000, G.B. & S.R. Monteith, mercury vapour lamp, 9266; 1♀ Boomer Range, site 8, 23°12'S 149°46'E, 220 m, 16.xii.1999–22.iii.2000, Monteith, flight intercept, open forest, 9226; 1♀ 2 km NNW. of Mt Robert, 21°21'S 148°29'E, 360 m, 19.xii.2000–25.iii.2001, Cook & Monteith, vine scrub, 9997; 7♀ 9.5 km NE. of Mt Salmon, 23°11'S 150°07'E, 60 m, 16.xii.1999–22.iii.2000, Monteith, on road, flight intercept, vine scrub, 9228; 1♀ Rundle Range National Park, site 1, 23°39'S 150°58'E, 15 m, 15.xii.1999–20.iii.2000, Monteith, flight intercept, vine scrub, 9111; 1♀ 3 km S of Pine Mt, 21°46'S 148°51'E, 230 m, 17.xii.1999–24.iii.2000, Monteith, flight intercept, vine scrub, 9242 (**QM**); 1♂ Gatton, 12.i.1961, M. Ludlow; 1♂ Dalby, 30.x.1979, H.E. & M.A. Evans & A. Hook; 1♂ Gympie, 26.v.1961, R.J. Nesser; 1♀ Aratula, 14.i.1952, M. W.; 1♂ Bundamba, 6.iv.1952, J. Davis; 1♂ Lawes, 22.i.1953, E. Jones; 1♂ 20 miles S. of Biloela, 7.i.1972, B. Cantrell; 1♀ 'Mourangee', Edungalba, 29.iii.1975, R.I. Storey; 1♂ Kingaroy, 10.xii.1942, A. Gardner; 1♂ Darra, 20.iii.1954, O.R. Byrne; 1♀ Planted Creek via Tansey, 12.xii.1976, G.B. & S.R. Monteith (**UQIC**); 1♂ Boomer Range NP, NW. of Rockhampton, 23°12.29'S 149°44.34'E, 30.ix.1999, Ewart, Burwell, Monteith, Evans, Edge Python Scrub, recorded; 1♂ 104 km S. of Rolleston, 25°18.09'S 148°39.60'E, 1.ii.2000, A.E., Acacia regrowth, *Notopsalta atrata*; 1♂ Brigalow Res. Stn, nr Theodore, 24°47.92'S 149°45.45'E, 21.xii.2000, A.E., N.W. brigalow section, recorded, *N. atrata*; 1♂ 'Allinga', Chinchilla, 9044/644484, 29.i.1998, brigalow; 3♂ 1♀ Hookswood Rd, ~6 km N. of Miles, 26°35.87'S 150°12.46'E, 17.x.1999, A. Ewart; 4♂ Hookswood Rd, 4.7 km N. of Racecourse Rd Jct., Miles, 26°35.88'S 150°12.54'E, 22.xi.1997, light; 1♀ same location as previous, 6.x.1998, Ewart; 1♂ same location as previous, 14.xii.1997, Ewart, *N. atrata*, recorded (box); 2♂ 2♀ 11.6 km SSW. of Leyburn, 28°06.44'S 151°33.73'E, 16.i.2001, A. Ewart, Cassinia/Poplar Box; 1♂ 6.4 km

SW. of R. Wicks R.S., Bringalily SF via Inglewood, 28°18.23'S 151°05.31'E, 20.xi.2007, A. Ewart, recorded open net, field, *N. atrata*; 1♂ Laidley Valley, 25 km S. of Laidley, 5.i.1992, R. Hall; 1♂ Lake Broadwater via Dalby, 9.xii.1987, Monteith & Thompson; 1♂ 6.1 km E. of Kaimkillenbun, 27°04.33'S 151°29.83'E, 19.xii.2001, A. Ewart, recorded, *Notopsalta atrata*; 1♀ Brigalow Creek, ~5 km NE. of Goondiwinid, 28°30.49'S 150°20.09'E, 17.i.2001, A. Ewart; 2♂ 7.1 km NNE. of Information Centre, Mt Moffatt NP, 24°58.17'S 147°58.91'E, 15.xii.2006, A. Ewart, *Notopsalta atrata*; 2♀ 1.3 km SW. of R. Wicks Res. Stn, Bringalily SF via Inglewood, 28°17.75'S 151°08.46'E, 13.xii.2007, A. Ewart, mv light; 1♀ R. Wicks, R.S., Bringalily via Inglwood, 28°17.49'S 151°08.97'E, 23.xi.2007, A. Ewart; 1♂ same data as previous, 20.xi.2007; 1♀ same data as previous, 21.xi.2007; 1♀ 25 km SE. of Goondiwindi, Macintyre R. flood plain, 28°39.24'S 150°31.72'E. 18.i.2001, A. Ewart, light; 1♂ 'Allinga', Chinchilla, 9044/644484, 29.i.1998, brigalow; 1♂ 1♀ same data as previous, 29.i.1998; 4♂ 2 km E. of Cracow, 18.ii.1979, recorded, creek flats; 1♂ 2 km W. of Uni. House, Cracow, 21.viii.1979, low shrubs, ridge; 1♂ Dunmore SF, 11.i.2000, S. Wilson, *Notopsalta atrata* (male); 14♂ 6♀ Girraween, 26.xi.1980; 3♂ 1♀ Boonah Rd turnoff W. of Ipswich, 2.xi.1980; 1♀ Samford, Mark's Pty, 2.xii.1978; 1♂ Mt Crosby, 4.i.1981, Brisbane; 1♂ Broadwater Ck, Stanthorpe, 28.i.1979; 1♂ Mitchell, 3.ii.1982, at light, ?small spotted grass cicada; 1♂ Iron Bark, Crows Nest, 22.xi.1975, to light; 1♂ same data as previous, low to med. height on tree trunk; 2♂ The Amphitheatre, NW. Robinson Gorge NP, 25°12.07'S 148°59.43'E, open forest (camp), 17.xii.1997; 1♂ Burwell Pty N. of Boonah, 27°53.80'S 152°41.89'E, 1.xi.1998, Ewart, Burwell, grass/pasture; 1♂ Big Womalilla Ck, 2nd crossing, 22 km W. of Mitchell, 26°29.25'S 147°44.56'E, 16.xi.1998, A. Ewart, mulga (**AE**); 1♂ Glenwood, 25°57.023'S 152°36.09'E, 27.xii.2007, B. Mallet; 1♂ Linthorpe Env. Park, 4.i.2006, D. Emery, L. Popple; 2♂ Mt Lindesay Rd, Peak Crossing, 12.xii.2002, D. Emery & L. Popple (**DE**); 10♂ 1♀ Mt Norman, 2.xii.1998, J. Moss, L. Popple & D. Sands, 281-003 to 281-0013; 1♂ Hookswood Road N. of Miles, 2.xii.1999, J. Moss & L. Popple, 281-0014; Razorback Road, 30 km SW. of Gatton, 500 m, 12.ix.1999, Leiper, Moss & Popple, 281-0015; 3♂ 3♀ Myall Park, 8 km N. of Glenmorgan, 27–28.xii.2001, L. Popple & A. Strange, mercury vapour lamp; 281-0016 to 281-0021; 1♂ Australiana Park, Warwick, SEQ, 23.xi.2001, L. W. Popple, 281-0022; 1♂ Brookstead, 3.xii.2001, L. Popple & J. Moss, 281-0023; 1♂ Intersection of New England and Cunningham Highways, 11.xii.2001, L. Popple & J. Moss, 281-0024; 1♂ Rennick's Mill, 26.7333°S, 150.4566°E, 2.x.1997, A. Ewart & J. Moss, 281-0025; 1♂ Gurulmundi State Forest, 2.xii.1999, L. Popple & J. Moss, 281-0026; 2♂ Mt Marlay via Stanthorpe, 6.i.2001, L. Popple & J. Moss, 281-0027 & 281-0028; 1♂ 3♀ Westbrook Creek, 7 km W. of Drayton, 3.xii.2001, J. Moss & L. Popple, 281-0029 to 281-0032; 1♂ 82 km N. of St George, 30.xii.2001, L. Popple & A. Strange, mercury vapour lamp, 281-0033; 1♂ Murphy's Creek, 19.ii.2000, J. Moss & L. Popple, 281-0034; 1♂ Cunningham's Gap, 11.xii.2001, L. Popple, J. Moss, 281-0035; 4♂ Crows Nest, 26.xii.2001, L. Popple & A. Strange, 281-0036 to 281-0039; 1♂ Atkinson's Lagoon, 27°26'S 152°27'E, 31.xii.1997, L. & R. Popple, open forest/woodland, 281-0040; 1♂ Columboola Environmental Education Centre, 28.xi–4.xii.1999, L. Popple & J. Moss, 281-0041; 1♂ 3 km S. of Lowood, 14.xii.1998, L. W. Popple, 281-0042; 1♂ 15 km N. of Monto, 14.xii.1999, L. Popple & J. Moss, 281-0043; 3♂ 1♀ 6 km W. of Thane, 28°09'41"S 151°57'59"E, 11.xii.2001, Hand collected, L. W. Popple, 281-0044 to 281-0047; 1♀ Linthorpe Environmental Reserve, 3.xii.2001, L. Popple & J. Moss, mercury vapour lamp, 281-0048; 1♂ Aratula, 15.xii.2001, L. Popple & R. MacSloy, 281-0049; 2♂ Drayton, 3.xi.2001, L. Popple, J. Moss, 281-0050 to 281-0051; 1♂ Willowvale, 5 km N. of Warwick, 11.xii.2001, L. Popple, J. Moss, 281-0052; 1♂ Kalbar, 17–20.xii.1998, L. Popple, J. Moss, 281-0053; 1♂ Willowvale N. of Warwick, 15.xii.2001, L. Popple & R. MacSloy, 281-0054; 1♂ 15 km ESE. of Oakey, 19.x.2003, L. Popple & A. Strange, 281-0056; 1♂ Laidley, 27°38'S 152°24'E, 25.xii.2003, J. Beard, at light, 281-0058; 1♂ 1♀ Humphrey Road via Binjour, 25°33'47"S 151°27'24"E, 26.xi.2004, L. Popple & M. Finlay-Doney, 281-0059, 281-0060 & 282-0007; 2♂ 1♀ Possum Park, 19 km N. of Miles, 25.xi.2005, L.W. Popple & N. Hando, mercury vapour lamp, 281-0062, 281-0063 & 282-0030; 1♂ Binjour Plateau State School, Burnett Highway, 27.xi.2005, L. Popple & M. Finlay-Doney, 281-0064; 1♂ Cooyar park, 26°58'53"S 151°49'50"E, 7.xii.2006, L. Popple & A. McKinnon, 281-0065; 1♀ 0.5 km along Marlong Plains Road, Mt Moffatt National Park, 25°57.70'S 147°59.86'E, 14.xii.2006, A. Ewart, mercury vapour lamp, 281-0066; 1♂ Girraween National Park, 28°49'50"S 151°56'37"S, 22.i.2010, L.W. Popple, grassy woodland, 281-0068 (**LWP**); 2♂ 1♀ Dumore State Forest, approx.. 50 km SW. of Dalby, 400 m, 30.i.1987, A. Hiller; 1♂ Amiens State Forest, W. of Stantorpe, 28°35'S 151°48'E, 1.xii.1985, G. Daniels; 1♀ Mt Marlay, Stanthorpe, 21.xii.1986, R. Eastwood; 1♂ Withcott, approx. 8 km NE. of Toowoomba, 17.xii.1976, M.S. & B.J. Moulds; 1♂ Yelarbon, 11.xi.1973, M.S. Moulds; 1♂ Connolly Dam, Warwick, 10.i.1990, R. Eastwood; 2♂ 15 km E. of Emu Vale, 20.xi.1980, G. Daniels; 1♂ 1♀ 3 km E. of Mourangee Hsd nr Edungalba, 28.i.1991, E. E.

Adams; 1♂ 2♀ 85 km S. of Rolleston, 20.xii.1983, M.S. & B.J. Moulds; 3♀ 70 km S. of Blackwater, 19.i.1987, M.S. & B.J. Moulds; 1♂ AU.QL.APE, 75 km E. of Alpha, 23°40.323'S 147°19.102'E, 28.i.2009, 342 m, K. Hill & D. Marshall; 1♂ AU.QL.CHY, 49 km W. of Emerald, 23°33.758'S 147°41.473'E, 28.i.2009, 262 m, K. Hill & D. Marshall; 1♂ 6 km NE. of Rolleston, 24.xi.1986, M.S. & B.J. Moulds; 1♂ 80 km S. of Rolleston, 24.xi.1986, M.S. & B.J. Moulds; 1♂ 1♀ AU.QL.EXP, Expedition Rg., on Dawson Hwy, 24°38.658'S 149°1.292'E, 437 m, 7.i.2009, Hill, Marshall, Moulds, Owen; 11♂ 2♀ AU.QL.ATT, 'Mingoola', 3.1 km NW. of Bruxner Hwy, 28°59.267'S 151°31.225'E, 4.i.2009, K. Hill, D. Marshall, Moulds, C. Owen (**MSM**); NEW SOUTH WALES: 1♀ Tamworth, NSW, 2.i.1966, C. N. Smithers; 11♂ 4♀ Wheogo, near Dunedoo, N.S.W., xii.1927, A. Musgrave, K295901 to K295915; 1♀ Tubrabucca, Up. Hunter Dist., N.S.W, 10.i.1948, 4,300 ft, A. Musgrave & Aust. Mus. Part, K295918; 2♂ 1♀ Rookwood NSW, 6.xii.1969, G. Daniels, K295892, K295898, K295899; 1♂ Ashton Coll., Penrith, 28.i.06, Melampsalta atrata, K295895; 1 ♂ Ashton Coll., K295897; 1♂ Melampsalta atrata, Mulgoa, 11.xi.06, Ashton Coll., K295900; 1♂ Northern N.S.W., xi.1933, A. Musgrave, K295919; 2♂ Adam's Scrub, 14.6km S. of Warialda, 29.667°S, 150.567°E, 385m, 18.xi.2009, D.R. Britton, J. Recsei, Callitris/sclerophyll forest, SEVT2009044 (MV Lamp), K295920, K295921; 1♂ Deriah Aboriginal Area, 23km E. of Narrabri, 30.345°S, 150.014°E, 406m, 10.xi.2009, D. R. Britton, J. Recsei, Ooline, SEVT2009003 (gen/sweep), K295922; 1♂ Killarney Gap, Kaputar NP, 30.141°S 150.066°E, 660m, 14.xi.2009, D. R. Britton, J. Recsei, Callitris & sclerophyll scrub/ rocky ridge, SEVT2009036 (MV Lamp), K295923; 2♂ Moema NP, 36.5km NE of Narrabri, 30.064°S, 149.965°E, 355m, 13.xi.2009, D.R. Britton, J. Recsei, Semi-evergreen vine thicket, SEVT2009029 (black light bucket), K295924, K295925; 1♂ Homebush, 1.ii.62; 1♂ Ryde, 27.xii.1973, J.V. Peters (**AM**); 1♂ Hartley Vale NSW, 9.i.1972, S. G. Watson Collection, Donated 2001, ANIC database number 00506, BOLD Proc. ID ANICY581-11; 1♂ 1♀, 4 mls SSW. of Portland, N.S.W., 3.xii.1948, K.H.L. & B. Key, [♂] ANIC Database No. 005610, ANICY581-11; 1♂ Chester Hill, xi.1927, M. Fuller, ANIC Database No. 005605; 1♂ same data as previous, x.1927; 8♂ Emu Plains NSW, 31.x.71, S. G. Watkins Collector, S. G. Watkins Collection Donated 2001; 2♂ same data as previous, 14.xi.1971; 1♂ same data as previous, 30.i.1972; 3♂ same data as previous, 31.xii.1971, [1♂] ANIC Database No. 005607, ANICY582-11; 2♂ same data as previous, 5.xii.1971; 3♂ same data as previous, 25.xii.1971; 1♂ Gundamain, x.1927, M. Fuller; 1♀ 32°15'S 149°46'E, 4 km NE. by N. of Ulan, N.S.W., 23.i.1986, K.H.L. Key (**ANIC**); 1♂ Castlereagh Nat. Res., Llandilo, 3.xi.2002, S. & D. Emery; 1♂ same locality as previous, 11.xi.2001, N., S. & D. Emery; 3♂ same data as previous, 2.ii.2002; 2♂ Luddenham Rd, St Marys, 5.xi.2000, S. Emery; 1♂ Mary Farm Rd, Camden, 6.xi.2004, D. Emery; 14♂ Carysfield Park, Bass Hill, 8.xi.2003, S., N. & D. Emery; 2♂ Menangie Rd, Menangie, 2.xii.2003, D. Emery & L. Popple; 1♂ St Ives Showground, 33°42.21'S 115°11.20'E, 23.xii.2012, N. & D. Emery (**DE**); 2♂ Bass Hill, 24.xi.2002, L. Popple, D. Emery. 281-0001 & 281-0002; 1♂ Carysfield Park, Bass Hill, 9.i.2000, S. N. & D. Emery, 281-0055; 1♂ 5 km S. of Camden, 30.xi–1.xii.2003, L. Popple & D. Emery, 281-0057; 1♂ Clandulla district, 32°54'18"S 149°56'40"E, 8.i.2010, L. Popple & D. Emery, open woodland, recorded, 281-0067 (**LWP**); 1♂ Razorback, near Camden, 3.xii.1970, J.V. Peters; 1♂ Carysfield Park, Bass Hill, 9.xii.19999, N. Emery; 1♂ same data as previous, S. & D. Emery; 1♂ same data as previous, D. Emery; 1♂ same data as previous, 9.i.2000, S. N. & D. Emery; 2♂ 1♀ Whalan, Sydney, 2.xi.1998, M.S. & B.J. Moulds; 1♂ Marden Park, Sydney, 10.x.1987, R. De Keyzer; 1♂ 1♀ Tamworth, 31°06'03"S 150°55'00"E, 15.i.1999, D.S. and Darien Horning, found dead on verandah, NSW-193; 2♂ Tamworth, 22.i.1972, M.S. Moulds; 1♀ 1.8 km E. Loomberah, 31°13'48"S 151°02'14"E, 2.xii.1999, on dead trunk of *Eucalyptus (Symphyomyrtus) melliodora*, NSW-204; 1♂ same data as previous, 6.xii.1999, NSW-120; 1♀ same data as previous, 20.xii.1998, NSW-190; 1♂ same data as previous, 23.xii.1995, NSW-82, *Notopsalta atrata* det. M. Moulds; 1♂ Rookwood Cemetery, near Sydney, 6.xi.1971, G. Daniels; 1♂ Narrabri, 4.xii.1970, F.T. South; 1♂ Tamworth, at light, 21.i.1972, M.S. Moulds, gen. prep. No. 1; 1♀ same data as previous, *Notopsalta atrata* det. M.S. Moulds, figured in A Guide to Aust. Cicadas, PLVIII, Fig. 7a; 1♀ Douglas Park, nr Picton 16.xii.1969, G. Seymour; 1♂ Dripping Rock, nr Boggabri, i.1993, G. Theischinger; 1♂ Capertee Valley, 26.x.1998, V. Powys; 1♂ same data as previous, 31.x.1998; 1♂ same data as previous, 15.xii.1998; 2♂ same data as previous, 17.xii.1998; 1♂ Sandy Hollow, 4.xii.1984, K.L. Dunn; 1♂ Mudgee, 16.xii.1975, G. Daniels; 1♂ Scone, 22.i.1972, M.S. Moulds; 1♂ Horton's Falls, approx. 25 km WNW. of Barraba, 11.xii.1988, G. Williams, at mv light in woodland; 1♂ 6 km S. Mendooran, 31°53'S 149°03'E, 12.ii.1992, mv lamp, G. Daniels, C.J. Burwell, genitalia preparation PAU291 (**MSM**).

Description. Male. (Figs 1H, 2H, 3O, 3P; Plates 8A–C).

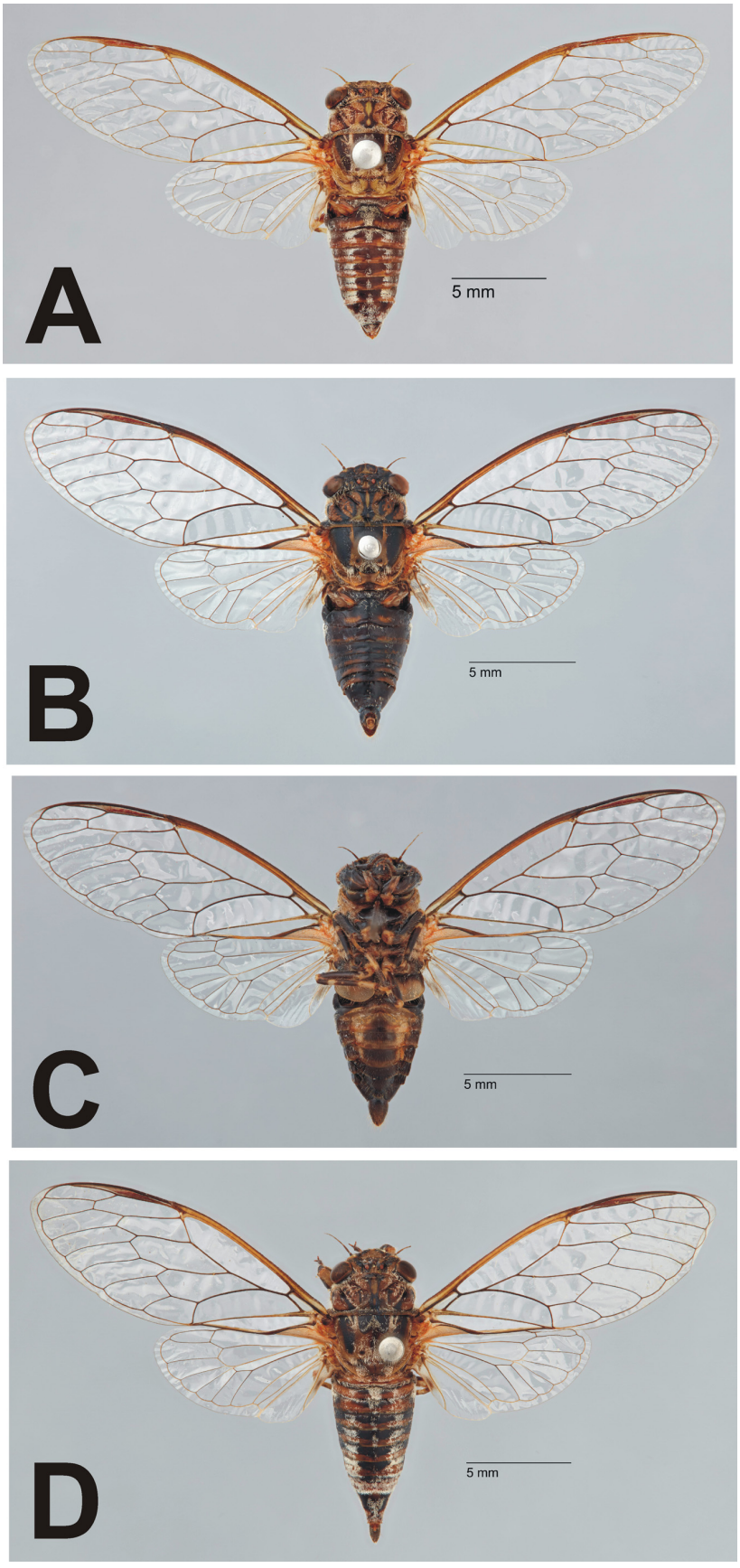

PLATE 8. *Myopsalta mackinlayi* (Distant): (A) male, 16 km N. of Boonah (27°54'S 152°41'E), dorsal view; (B) male, Boomer Range (23°12'S 149°45'E), dorsal view; (C) male, same as previous, ventral view; (D) female, same locality as previous, dorsal view.

Head: Postclypeus predominantly brown to pale brown, dark brown to black anterio-laterally and ventro-medially, with a pale brown spot anterio-medially; supra-antennal plates pale brown; genae black; mandibular plates dark brown, brown along lateral margins, with silver pubescence; vertex and frons dark brown to black, tending pale brown anterio-laterally and surrounding epicranial suture; ocelli pink; compound eyes brown; anteclypeus pale brown to orange-brown; rostrum brown, dark brown apically, extending beyond anterior margins of hind coxae; antennae brown to dark brown.

Thorax: Pronotum brown to olive-brown with mottled dark brown to black colouration surrounding paramedian and lateral fissures and in a narrow band anterior to pronotal collar; central fascia brown to pale brown, surrounded with black colouration, which broadens along anterior and posterior pronotal margins; pronotal collar mostly brown to pale brown, tending dark brown anteriorly and on lateral angles; metanotum dark brown to black; mesonotum including submedian and lateral sigilla, black, with brown areas between the submedian and lateral sigilla extending on to arms and lateral sides of cruciform elevation and posterior half of wing grooves; posterior third of mesonotum with dense fine and mid-dense long silver pubescence.

Wings: Fore wings hyaline; basal membranes orange to pale orange-brown; pterostigmata orange to reddish brown; veins, including costal vein, brown to dark brown, darker distally. Hind wing plagas white at base, grading to pale grey along basal two thirds; jugal folds grey to cream, hyaline apically; veins pale brown basally, brown medially, dark brown on distal third.

Legs: Fore coxae pale brown, with broad longitudinal brown areas on medial anterior and posterior sides; mid and hind coxae dark brown, pale brown on inner sides and apices; meracantha spikes dark brown, becoming pale brown apically, overlapping opercula; fore femora pale brown with brown to dark brown longitudinal areas on outer anterior and posterior sides; mid femora brown, darker on dorsal side, with pale brown apices; hind femora variably dark brown to brown with pale brown bases and apices; fore tibiae brown to dark brown; mid tibiae brown to dark brown, each with a pale brown band above base; hind tibiae pale brown, with mottled dark brown areas medially; fore and mid tarsi brown; hind tarsi brown to pale brown; pretarsi brown to orange-brown with darker apical areas; claws brown to pale brown.

Opercula (Fig. 1H): Broadly rounded; pale brown to dark brown basally, extensively pale brown over remainder; plates undulating with medial areas depressed.

Timbals (Fig. 2H): Anterior rib 5 abbreviated; rib 4 also abbreviated, with a prominent isolated remnant extension ventrally; ribs 1 and 2 joined ventrally and fused dorsally to basal spur; anterior termination of basal spur fused with ribs 3–4, with rib unattached; prominent intercalary short ribs in medial areas between ribs 1 and 2, 2 and 3, and 3 and 4 (three in total).

Abdomen: Tergite 1 dark brown; tergite 2 wider along dorsal midline than tergites 3 to 7; tergites 2 to 7 dark brown to black, often with brown to yellow-brown areas on dorso-lateral posterior margins, becoming less conspicuous on posterior tergites; tergite 8 dark brown to black; tergites 2 to 8 with dense short silver pubescence on dorso-lateral sides and with extensive long and short silver pubescence on lateral sides; intersegmental membranes pale yellow-brown; epipleurites brown to dark brown anteriorly grading to pale brown posteriorly, with sparse silver pubescence; sternite II black laterally, pale brown ventro-laterally, with a dark brown area medially and a pale brown posterior margin; sternites III to VI pale brown laterally, with brown to dark brown areas medially, which broaden posteriorly, gradually increasing in size distally in each successive sternite; sternite VII dark brown to black with diffuse pale brown areas at extreme anterio-lateral margins; sternite VIII dark brown to black; anterior sternites visible in lateral view.

Genitalia (Figs 3O, P): Pygofer brown to dark brown; upper lobes in ventral view with terminals directed dorsally and inwards, apically acute; basal lobes in ventral view relatively linear and apically rounded, in lateral view curved; median lobe of uncus rounded, protruding noticeably; claspers in ventral view conspicuous, diverging markedly, with sharply developed apices; pseudoparameres projecting further (ventrally) than endotheca and ventral support; ventral support acute, projecting slightly beyond endotheca; endotheca fleshy.

Female (Plate 8D): Head, thorax, wings and legs match description of male.

Abdomen: Tergite 1 black; tergites 2 to 8 dark brown to black, with broad brown areas on posterior dorso-lateral to submedial sides, often most extensive on tergite 2; auditory capsules black; abdominal segment 9 black on dorsal and lateral sides, pale olive-brown ventrally; dorsal beak brown, sharply defined; sternite II dark brown to black laterally and medially, otherwise pale to medium brown; epipleurites pale brown, dark brown to black anterio-laterally; sternites III to VI pale brown with black areas medially, broadening posteriorly, typically similar

in width, though often narrow on sternite II and widest on sternite IV; sternite VII pale brown; ovipositor sheath extends approximately 1.0 mm beyond termination of abdominal segment 9.

Measurements. N=22♂ 12♀. Ranges and means (in parentheses), mm; BL: ♂ 11.2–14.5 (13.32); ♀ 11.3–15.1 (13.47). FWL: ♂ 14.0–18.2 (15.95); ♀ 13.7–17.1 (15.47). HW: ♂ 3.4–4.5 (4.12); ♀ 3.5–4.3 (3.89). PW: ♂ 3.3–4.6 (4.00); ♀ 3.3–4.4 (3.88). AW: ♂ 3.5–5.1 (4.28); ♀ 3.4–4.5 (3.86). FWL/W: ♂ 2.50–2.91 (2.72); ♀ 2.62–3.25 (2.87). OL: ♀ 4.0–5.7 (4.79).

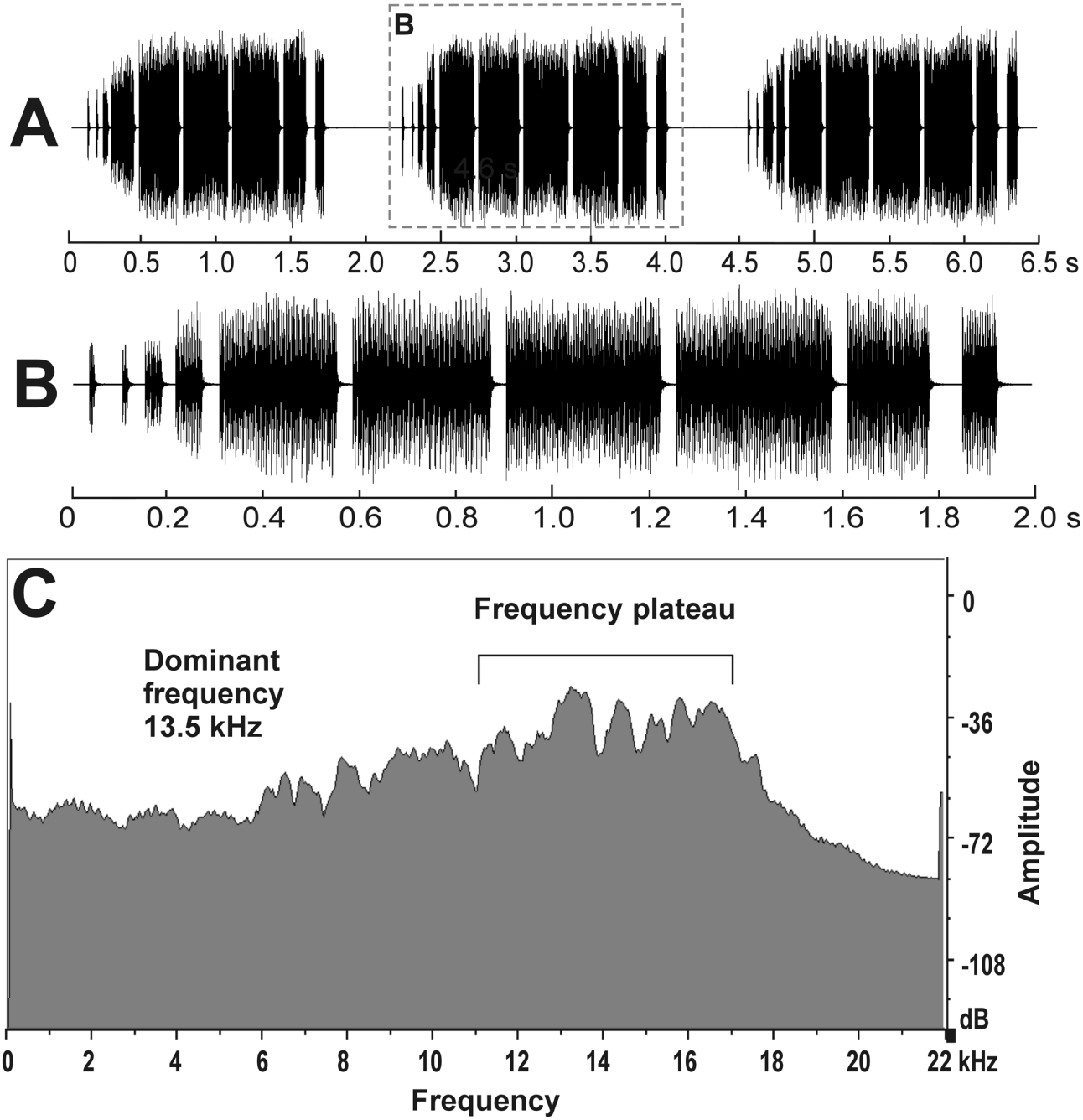

FIGURE 18. Male day calling song structure of *Myopsalta mackinlayi* (Distant) from a recording obtained at Boomer Range (23°12'S 149°45'E) by A. Ewart using RS3 (see Methods). (A) Wave plot illustrating three phrases, each commencing with two single syllables and one or two macrosyllables, followed by a series of five echemes and concluding with a final macrosyllable. (B) Expanded wave plot showing the detailed structure of one phrase. (C) Spectrogram showing the highest amplitude frequency plateau and dominant frequency.

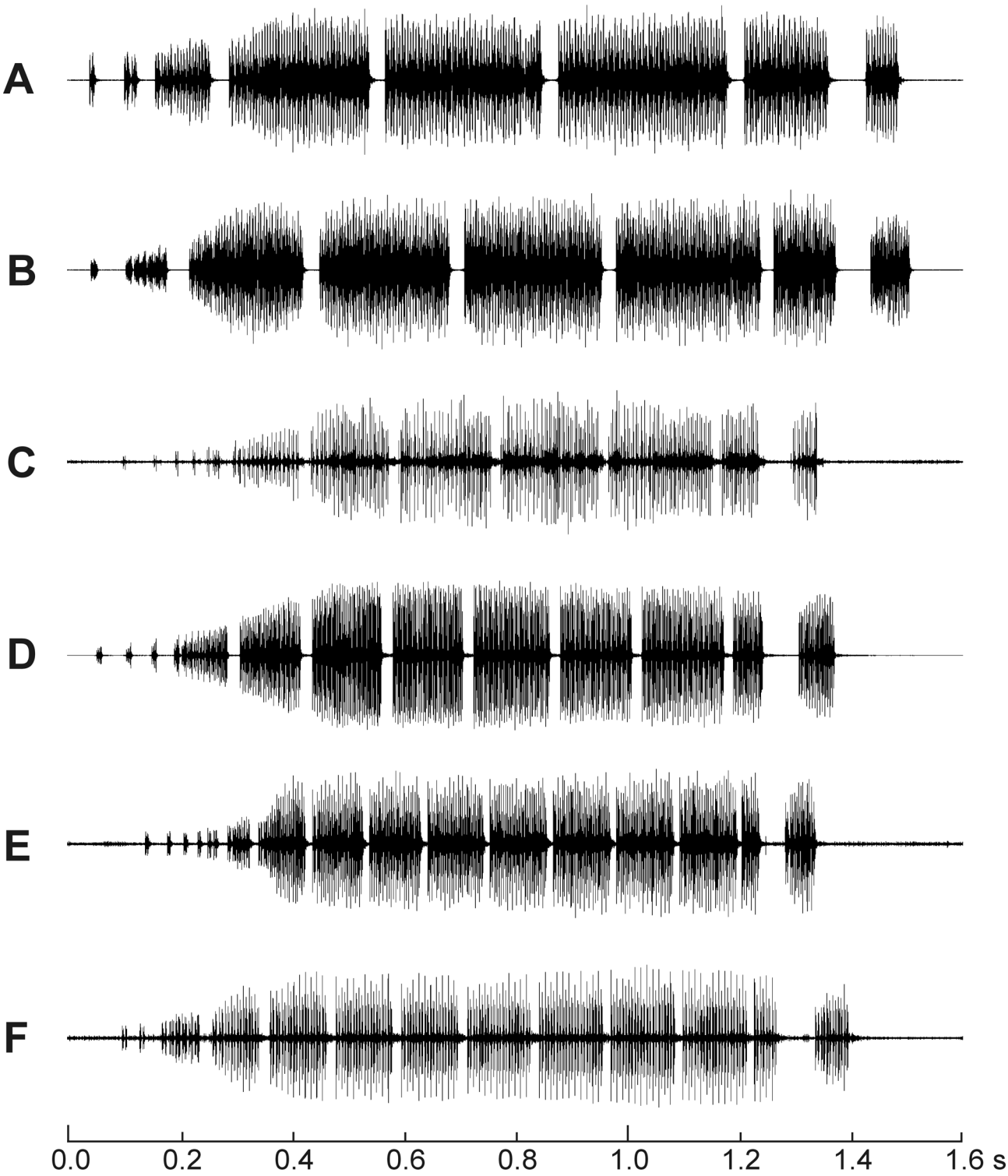

FIGURE 19. Wave plots illustrating the calling song of *Myopsalta mackinlayi* (Distant) from six different locations, including (A) Boomer Range (23°12'S 149°45'E), (B) Brigalow Research Station (24°48'S 149°45'E), (C) Ceratodus (25°17'S 151°08'E), (D) 6.1 km E. of Kaimkillenbun (27°04'S 151°30'E), (E) Girraween (28°50'S 151°57'E), and (F) Clandulla (32°54'S 149°57'E). Recordings were obtained by A. Ewart using RS3 (A, B, D), and the author using RS2 (C) and RS5 (E, F) (see Methods).

Morphological distinguishing features. *Myopsalta mackinlayi* can be distinguished from *M. atrata*, *M. binotata*, *M. coolahensis*, *M. gordoni* **n. sp.**, *M. lactea*, *M. libritor*, *M. waterhousei* and *M. xerograsidia* **n. sp.** by the colour of the basal membranes of the fore wings, which is pale brown or pale orange rather than white to pale grey. It can be distinguished from *M. melanobasis* **n. sp.** and *M. platyptera* **n. sp.** by the appearance of the fore wing clavus, which is entirely hyaline and not opaque at the base. Males and females can be separated from *M.*

albiventris **n. sp.** and *M. wollomombii* by the colouration of the sternites, which is predominantly dark brown (cf. almost entirely pale brown). They can be differentiated from *M. umbra* **n. sp.** by the colour of the costal veins, which is brown rather than reddish-brown. Males can be distinguished from *M. septa* **n. sp.** by the colouration on the dorso-lateral sides of the tergites, which is brown rather than black. They can be separated from *M. crucifera* by the colour of their fore wing costal veins, which is brown rather than pale brown or pale reddish brown. They can be distinguished from *M. chrysopedia* **n. sp.,** *M. longicauda* **n. sp.**, *M. majurae* **n. sp.** and *M. riverina* **n. sp.** by having a head width of <4.7 mm, and from *M. parvula* **n. sp.** by having contrasting pale brown lateral edges on sternite III (cf. almost entirely dark brown to black). In addition, they can be separated from *M. bassiana* **n. sp.** and *M. leona* **n. sp.** by the colour of the opercula being predominately pale brown (cf. dark brown, black or dull, fleshy brown). Females can be distinguished from *M. leona* **n. sp.**, *M. chrysopedia* **n. sp.**, *M. crucifera*, *M. longicauda* **n. sp.**, *M. parvula* **n. sp.** and *M. septa* **n. sp.** by the length of the ovipositor sheath, which extends approximately 1.0 mm beyond the apex of abdominal segment 9 (cf. 0.5 mm in *M. parvula* and ≥2 mm in the other species). They can not be differentiated consistently from the closely similar *M. bassiana* (male specimens are required).

Distribution, habitat and behaviour (Fig. 17). *Myopsalta mackinlayi* is found from Peak Downs (type locality) in central Queensland through much of the drier eastern third of southern Queensland south to the Capertee Valley and Camden in central eastern New South Wales. Populations occur in grassy woodland, open forest and in the margins of brigalow woodland and semi-evergreen vine thicket where the adults are typically found on tree trunks, posts, grasses and on shrubs. Adults have been found from September to April. Within their geographical distribution, males can often be heard calling even during drought conditions when few (or no) other cicadas are calling. It is an especially common and widespread cicada.

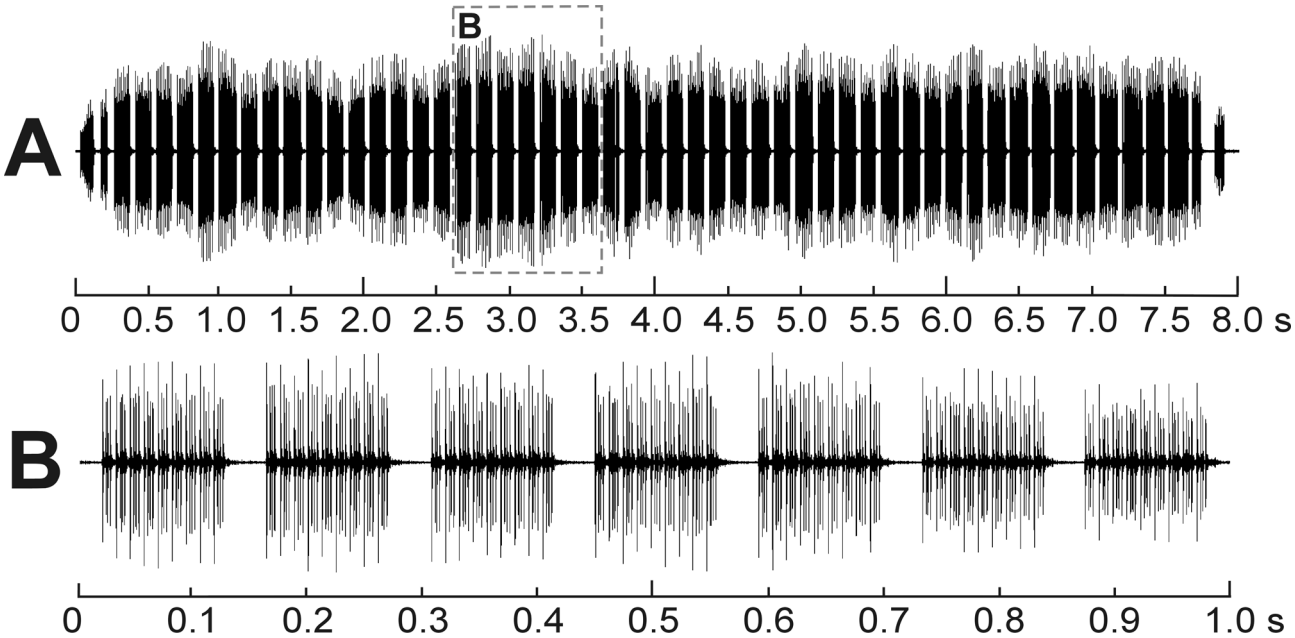

FIGURE 20. Male dusk calling song structure of *Myopsalta mackinlayi* (Distant) from a recording obtained at Coolbaggie (31°59'S 148°32'E) by the author using RS2 (see Methods). (A) Wave plot illustrating a repetitive series of echemes followed by a long macrosyllable. (B) Expanded wave plot showing the detailed structure of seven echmes.

Calling song (Figs 18–20). This species is atypical in the genus *Myopsalta* because it produces slightly different song structures in the day and at dusk. The day calling song contains a set of monotonously repeated phrases. Each phrase begins with a single syllable or doublet (0.006–0.025 s) followed by 1–2 additional syllables or doublets and typically 1–2 macrosyllables (0.035–0.081 s) and then a series of 3–13 (usually 5–10) echemes of 0.056–0.308 s duration separated by short gaps of 0.009–0.040 s (all statistics, *n*=50 recordings; Figs 18, 19). With the exception of the first few (introductory) phrases, each phrase ends with two shorter echemes 0.036–0.105 s duration, separated by a gap of 0.044–0.091 s. The phrase ends with a final long gap of 0.277 s to 1.071 s. It is expected that the female would respond during the long gap at the end of each phrase, following the second shorter echeme; however this interactions has never been recorded in this species. A characteristic of the song is that the first introductory (macro)syllable(s) are 2–3 times quieter than the series of echemes that follow.

Some variation is evident in the number and duration of macrosyllables within each phrase of the day calling song across the geographical distribution of this species (Fig. 19). In central Queensland, the number of echemes in each phrase is typically fewer (3–5) and their duration is longer (0.250–0.308 s). In southern Queensland and New South Wales, the number of echemes is greater (6–13), with number increasing broadly with latitude, and their duration is also shorter (0.056–0.193 s). Further recordings from areas of southern Queensland closer to the Tropic of Capricorn would be required to determine whether the southern and northern song types overlap or coalesce in structure. Based on current data, *M. mackinlayi* has the potential to be a cryptic species complex.

Despite the apparent variation in the temporal structure of the day calling song, the calls maintain a relatively even frequency distribution throughout, exhibiting a high amplitude plateau of 9.7–14.1 kHz, occasionally reaching 17.7 kHz.

The dusk calling song is effectively a monotonously repeated varation of the day calling song. It commences with a series of soft syllables or macrosyllables, then builds into a monotonous series of echemes (0.105–0.270 s duration), separated by gaps of 0.021–0.037 s duration (all statistics, n=2 recordings; Fig. 20). The dusk song has been observed in populations from south-east Queensland and New South Wales. Whether populations in central Queensland produce the dusk song remains unknown.

***Myopsalta majurae* n. sp.**
(Figs 1I, 21A, 22A, 22B, 17, 23; Plate 9)

Types. **Holotype**: ♂ AUSTRALIA ACT, Mt Majura–Mt Ainslie, 11.xii.2010, LT2009371, L.W. Popple, 35°14'42"S 149°10'40"E, 676-0001, ANIC Database No. 20-014381 **(ANIC)**; **Paratypes**: AUSTRALIAN CAPITAL TERRITORY: 1♂ Mt Majura–Mt Ainslie, 35°14'42"S 149°10'40"E, 11.xii.2010, L.W. Popple, LT2009371, 677-0002 (**LWP**); 1♂ Australian Capital Territory, Mt Majura–Mt Ainslie, 35°15'53"S 149°10'10"E, 2.xii.2016, L.W. Popple, M. Milner, 676-0003 **(MSM)**.

Etymology. Named after Mt Majura in Canberra; this is an important location for the species because all known records have been obtained in the vicinity of Mt Majura and Mt Ainslie.

Description. Male. (Figs 1I, 21A, 22A, 22B; Plate 9).

Head: Postclypeus predominantly black, pale pinkish-brown along lateral margins and with a pale brown area medially on dorsal side, narrowing anteriorly; supra-antennal plates and genae black; mandibular plates black, brown, covered by silvery pubescence; vertex and frons black with a small pale brown diamond-shaped area extending narrowly along epicranial suture from near median ocellus to anterior margin of pronotal collar, covered in sparse silvery pubescence; ocelli pale red; compound eyes brown; anteclypeus black; rostrum dark brown, black apically, extending beyond posterior margins of mid coxae; antennae dark brown to black.

Thorax: Pronotum brown; central fascia prominent, yellow-brown, surrounded with black colouration, which broadens along anterior and posterior pronotal margins; with broad, irregular black patches near paramedian and lateral fissures, and narrow black areas along lateral margins; pronotal collar dark brown to black, with brown posterior margin; metanotum black; mesonotum, including submedian and lateral sigilla, black, with brown areas between the submedian and lateral sigilla, sometimes also on lateral margins of lateral sigilla, and pale brown on arms and lateral sides of cruciform elevation, extending on to posterior half of wing grooves; posterior third of mesonotum with dense fine and sparse long silver pubescence.

Wings: Fore wings hyaline; basal cells orange to pale orange-brown; pterostigmata dull reddish-brown; veins, including costal vein, brown to dark brown, darker distally. Hind wing plagas white at base, grading to dark grey-brown along basal two thirds, this colour extending broadly along jugal folds and terminating before apices, hyaline over remainder; veins pale brown basally, brown medially, dark brown on distal third.

Legs: Fore coxae pale brown to dark brown, with longitudinal black areas on medial anterior and posterior sides, joints pinkish-red; mid and hind coxae black, with pale red joints, pale brown apically; meracantha spikes dark brown, becoming pale brown apically, or entirely pale brown, overlapping opercula; fore femora dark brown with pale brown longitudinal areas on outer anterior sides, pale brown at apices; mid and hind femora dark brown with pale brown apices; fore tibiae black; mid tibiae dark brown, each with a pale brown band above base; hind tibiae dark brown, each with two pale brown bands, one above base, other towards apex; fore and mid tarsi dark brown; hind tarsi brown; pretarsi brown with dark brown apical areas; claws dark brown.

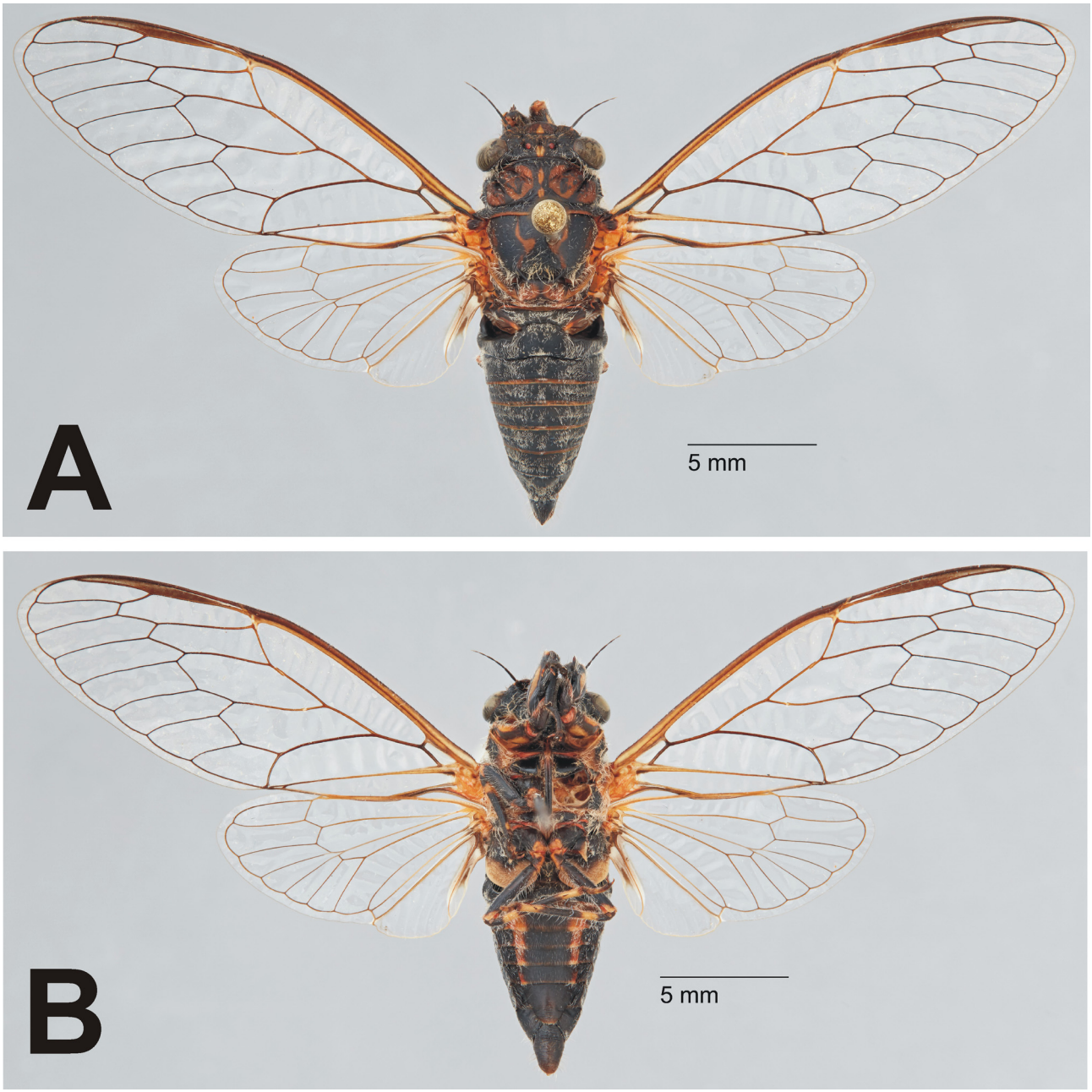

PLATE 9. *Myopsalta majurae* **n. sp.**: (A) male holotype, Mt Majura–Mt Ainslie (35°15'S 149°11'E), dorsal view; (B) male holotype, ventral view.

Opercula (Fig. 1I): Broadly rounded; dark brown basally grading to brown or pale brown at crest; plates undulating, each with two ridges, basal ridges sharply defined, apical ridges gradual, medial areas between ridges depressed.

Timbals (Fig. 21A): Anterior rib 5 abbreviated; rib 4 also abbreviated, with a prominent isolated remnant extension ventrally; ribs 1 and 2 joined ventrally and fused dorsally to basal spur; anterior termination of basal spur fused with ribs 3–4, with rib 5 unattached; prominent intercalary short ribs in medial areas between ribs 1 and 2, 2 and 3, and 3 and 4 (three in total).

Abdomen: Tergite 1 black; tergite 2 wider along dorsal midline than tergites 3 to 7; tergites 2 to 7 black, all with dense short silver pubescence on dorso-lateral sides and with extensive long and short silver pubescence on lateral sides; tergite 8 black, covered in short silver pubescence; intersegmental membranes pale brown; epipleurites black, with sparse silver pubescence; sternite II black, sometimes with narrow pinkish-brown to orange-brown areas on posterior dorso-lateral margins; sternites III to VI black medially, with narrow pinkish-brown areas

laterally, narrowing distally, being narrowest on sternite VI; sternite VII black with diffuse pinkish-brown areas at extreme posterio-lateral margins; sternite VIII black; anterior sternites visible in lateral view.

Genitalia (Figs 22A, B): Pygofer black; upper lobes in ventral view relatively linear, with terminals directed slightly inwards and tapering broadly; basal lobes in ventral and lateral views, bulbous; median lobe of uncus rounded, slightly protruded; claspers in ventral view conspicuous, diverging from point of downward deflection, with relatively broad apices; pseudoparameres projecting further (ventrally) than endotheca and ventral support; ventral support acute, projecting slightly beyond endotheca; endotheca fleshy.

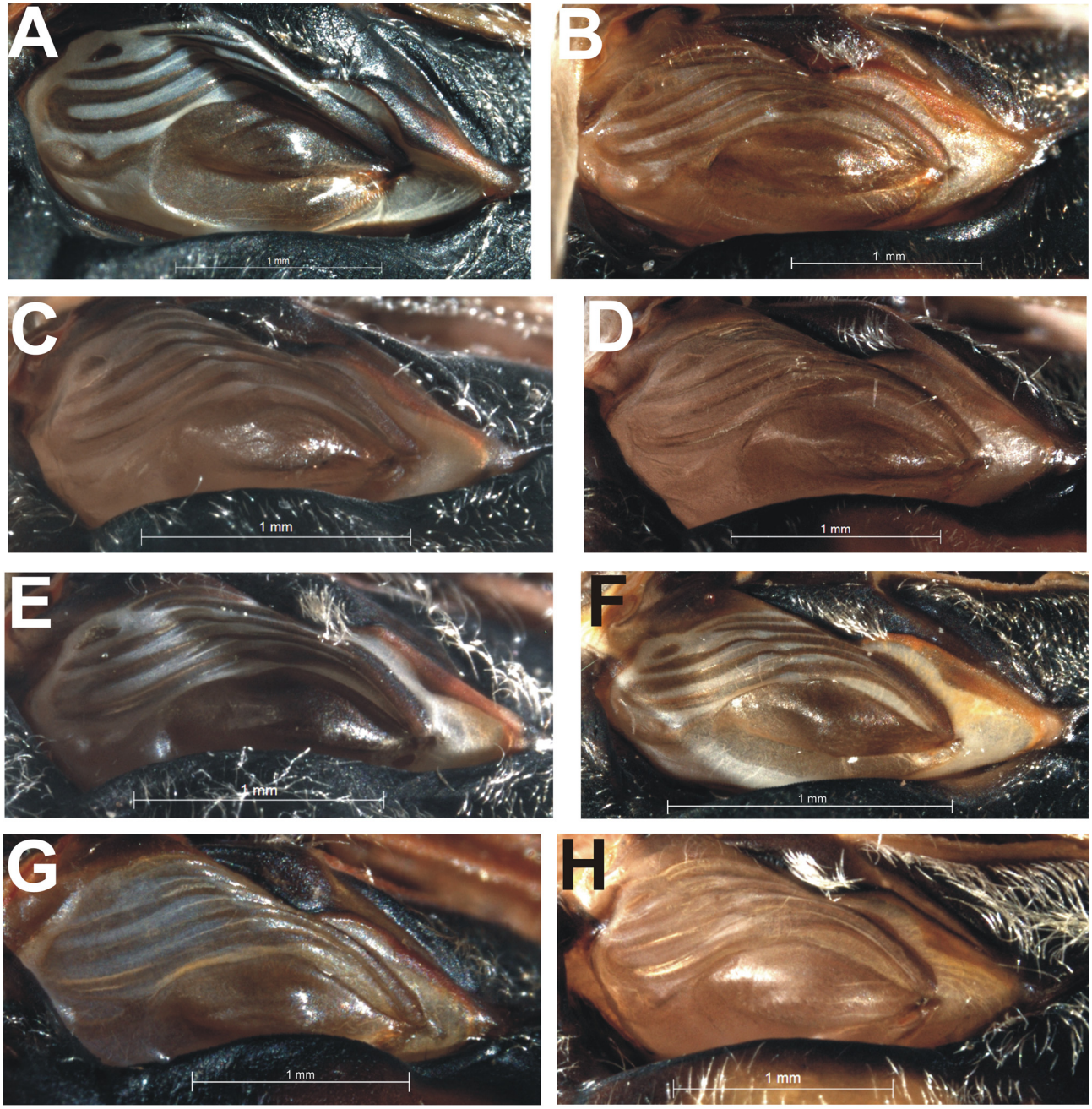

FIGURE 21. Photographs of male left timbals, with dorsal edge at right and posterior margin at bottom. (A) *Myopsalta majurae* **n. sp.**, Mt Majura–Mt Ainslie (34°15'S 149°11'E); (B) *M. melanobasis* **n. sp.**, 14.6 km W. of Drillham Creek (26°39'S 149°50'E); (C) *M. parvula* **n. sp.**, Acton (35°16'S 149°07'E); (D) *M. platyptera* **n. sp.**, Brigalow Research Station (24°49'S 149°45'E); (E) *M. riverina* **n. sp.**, 33 km SSW. of Rankins Springs (33°55'S 145°56'E); (F) *M. septa* **n. sp.**, Tannymorel (28°19'S 152°08'E); (G) *M. umbra* **n. sp.**, Binjour Plateau (25°32'Sx152°30'E); (H) *M. xerograsidia* **n. sp.**, 4.3 km W. of Cloncurry River (20°43'S 140°27'E).

FIGURE 22. Photographs of male pygofer, viewed laterally from left and ventrally. *Myopsalta majurae* **n. sp.**, Mt Majura–Mt Ainslie (34°15'S 149°11'E), (A) lateral, (B) ventral; *M. melanobasis* **n. sp.**, 14.6 km W. of Drillham Creek (26°39'S 149°50'E), (C) lateral, (D) ventral; *M. parvula* **n. sp.**, Acton (35°16'S 149°07'E), (E) lateral, (F) ventral; *M. platyptera* **n. sp.**, Brigalow Research Station (24°49'S 149°45'E), (G) lateral, (H) ventral; *M. riverina* **n. sp.**, 33 km SSW. of Rankins Springs (33°55'S 145°56'E), (I) lateral, (J) ventral; *M. septa* **n. sp.**, Tannymorel (28°19'S 152°08'E), (K) lateral, (L) ventral; *M. umbra* **n. sp.**, Binjour Plateau (25°32'Sx152°30'E), (M) lateral, (N) ventral; *M. xerograsidia* **n. sp.**, 4.3 km W. of Cloncurry River (20°43'S 140°27'E), (O) lateral, (P) ventral.

Female: Unknown.

Measurements. N=3♂. Ranges and means (in parentheses), mm; BL: ♂ 15.6–16.7 (16.20). FWL: ♂ 18.5–20.6 (19.8). HW: ♂ 4.7–5.0 (4.87). PW: ♂ 4.9–5.2 (5.07). AW: ♂ 4.8–5.3 (5.07). FWL/W: ♂ 2.53–2.74 (2.63).

Morphological distinguishing features. Males of *Myopsalta majurae* **n. sp.** can be distinguished from *M. atrata*, *M. binotata*, *M. coolahensis*, *M. gordoni* **n. sp.**, *M. lactea*, *M. libritor*, *M. waterhousei* and *M. xerograsidia* **n. sp.** by the colour of the basal membranes of the fore wings, which is pale brown or pale orange rather than white to pale grey. They can be distinguished from *M. melanobasis* **n. sp.** and *M. platyptera* **n. sp.** by the appearance of the fore wing clavus, which is entirely hyaline and not opaque at the base. They can be separated from *M.*

albiventris **n. sp.** and *M. wollomombii* by the colouration of the sternites, which is predominantly dark brown (cf. almost entirely pale brown). They can be differentiated from *M. umbra* **n. sp.** by the colour of the costal veins, which is brown rather than reddish-brown. In addition, they can be distinguished from *M. septa* **n. sp.** and *M. crucifera* by the colouration of sternite VII, which is entirely dark brown to black (not bordered with pale brown on any margin). They can be distinguished from *M. leona* **n. sp.** and *M. parvula* **n. sp.** by having a head width >4.4 mm and fore wing width >6.0 mm, and from *M. chrysopedia* **n. sp.** by having a fore wing length/width ratio of <2.9. They can be separated from the closely similar *M. mackinlayi* and *M. riverina* **n. sp.** by the colouration of the opercula, which is dark brown to black rather than predominantly pale brown. Finally, they can be separated from *M bassiana* **n. sp.** and *M. longicauda* **n. sp.** by the absence of contrasting pale brown colouration on the ventro-lateral sides of sternite II (instead, this feature is mostly dark brown to black). Females are unknown.

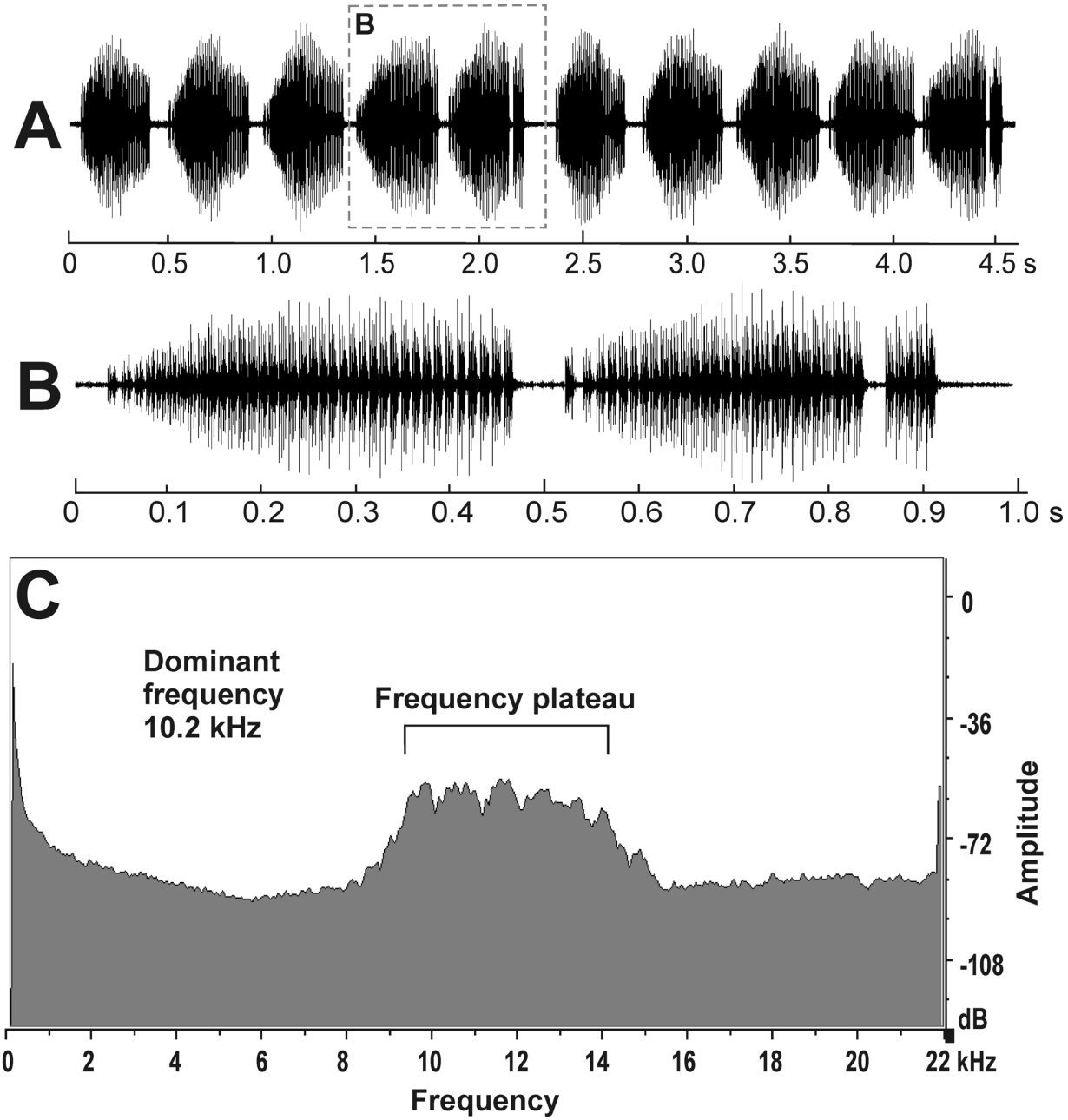

FIGURE 23. Male calling song structure of *Myopsalta majurae* **n. sp.** from a recording obtained at Mt Majura–Mt Ainslie (34°15'S 149°11'E) by the author using RS5 (see Methods). (A) Wave plot of two complete phrases, each containing a series of five echemes followed by a macrosyllable. (B) Expanded wave plot showing the detailed structure of two echemes and macrosyllable at the end of a phrase. (C) Spectrogram showing the highest amplitude frequency plateau and dominant frequency.

Distribution, habitat and behaviour (Fig. 17). *Myopsalta majurae* is presently known only from the slopes of Mt Majura and Mt Ainslie in the Australian Capital Territory. The single known population occurs in grassy woodland and on the fringes of monoculture forests of *Allocasuarina verticellata*. Adults have been collected in early–mid December. Males sit on the stems of small trees and shrubs. They sing sporadically during warm conditions.

Calling song (Fig. 23). The calling song contains a set of repeated phrases of variable duration. Each phrase contains 4–10 (typically 4–7) long echemes, each 0.326–0.411 s duration and separated by gaps of 0.041–0.081 s duration (all statistics, *n*=3 recordings). Each phrase ends with a slightly shorter echeme (0.278–0.306 s duration), short gap (0.020–0.026 s duration), a macrosyllable (0.047–0.064 s duration) and a longer gap (0.153–0.172 s duration). It is anticipated that females respond during the gap following the macrosyllable at the end of each phrase, although there are presently no observations to support this prediction.

This species calls during the day and is not known to sing at dusk. The calling song maintains an even frequency distribution throughout, with a high amplitude plateau of 9.7–14.2 kHz and a dominant frequency of approximately 10.2 kHz.

Myopsalta melanobasis n. sp.

(Figs 1J, 17, 21B, 22C, 22D, 24, 25; Plate 10)

Types. **Holotype**: ♂ 14.6 km W. of Drillham Creek, 26°38.62'S 149°49.96'E, 16.xi.1998, A. Ewart, Brigalow, QM Reg. No. T239569 **(QM)**; **Paratypes**: QUEENSLAND: 1♂ same data as holotype; 1♂ same data as previous, recorded; 2♂ Brigalow Township (20 km SE. of Chinchilla), 26°59.96'S 150°47.88'E, 16.x.1998, Ewart, Brigalow; 2♂ 14.9 km W. of Drillham, 26°38.60'S 149°49.99'E, 10.i.2002, A. Ewart, Brigalow; 3♂ 1♀ 1 km E. of Brigalow Township, 22.xii.2001, 26°59.94'S 150°47.83'E, A. Ewart, Brigalow (**AE**); 1♀ same data as previous (**QM**); 3♂ Queensland, Southwood National Park via Moonie, 5–10.xii.2005, L. Popple & A. Ewart, 27°48'25"S 150°05'15"E, 283-0001 to 283-0003 (**LWP**); 2♂ AU.QL.INW, approx.. 28 km W. of Injune, 25°47.557'S 148°20.241'E, 476 m, 10.ii.2008, K. Hill, D. Marshall, M. Moulds, C. Owen, M. Humphrey; 1♂ same data as previous, C. Simon Lab Voucher, legs in ETOH, body pinned, 08.AU.QL.INW.01, specimen recorded; 1♂ same data as previous, 08.AU.QL.INW.02, specimen recorded (**MSM**).

Etymology. A Latinised, compound noun (presented in apposition) of the Greek words *melanos* and *basis*, which translates to 'dark base', referring to the opaque, dark brown base of the clavus. Within the genus *Myopsalta*, this feature is is shared only with *M. platyptera* **n. sp.**

Description. Male. (Figs 1J, 21B, 22C, 22D; Plates 10A, 10B).

Head: Postclypeus predominantly black, pale brown to orange-brown along lateral and ventral and along adjacent grooves, with a pale brown marking extending from medial anterior on to dorsal side and widening posteriorly; supra-antennal plates dull brown to dark brown; genae black; mandibular plates black with orange-brown margins, covered by silvery pubescence; frons black; vertex black, with a pale brown area extending along epicranial suture from median ocellus to posterior margin; vertex and frons with sparse silvery pubescence; ocelli pink; compound eyes brown; anteclypeus black, pale brown medially; rostrum brown to dark brown, darker apically, extending to posterior margins of mid coxae; antennae dark brown to black.

Thorax: Pronotum brown; central fascia dull yellow-brown, surrounded with black colouration, which broadens towards anterior and posterior pronotal margins; interior pronotum with irregular dark brown to black patches near paramedian and lateral fissures; lateral margins partly black; pronotal collar black, with brown to dark brown posterior margins; metanotum dark brown to black; mesonotum including submedian and lateral sigilla, black, with brown areas on lateral sides of lateral sigilla and between the submedian and lateral sigilla extending on to arms and lateral sides of cruciform elevation and posterior half of wing grooves; posterior third of mesonotum with dense fine and sparse long silver pubescence.

Wings: Fore wings hyaline; basal membranes pale orange; pterostigmata reddish-brown; proximal tenth of clavi and distal third of basal cells opaque, dark brown, hyaline over remainder; veins, including costal vein, pale brown to brown, darker distally. Hind wing plagas white at base, this colour extending along jugal folds and terminating before apices, pale grey-brown medially; hyaline over remainder; veins pale brown basally, brown to dark brown on distal half.

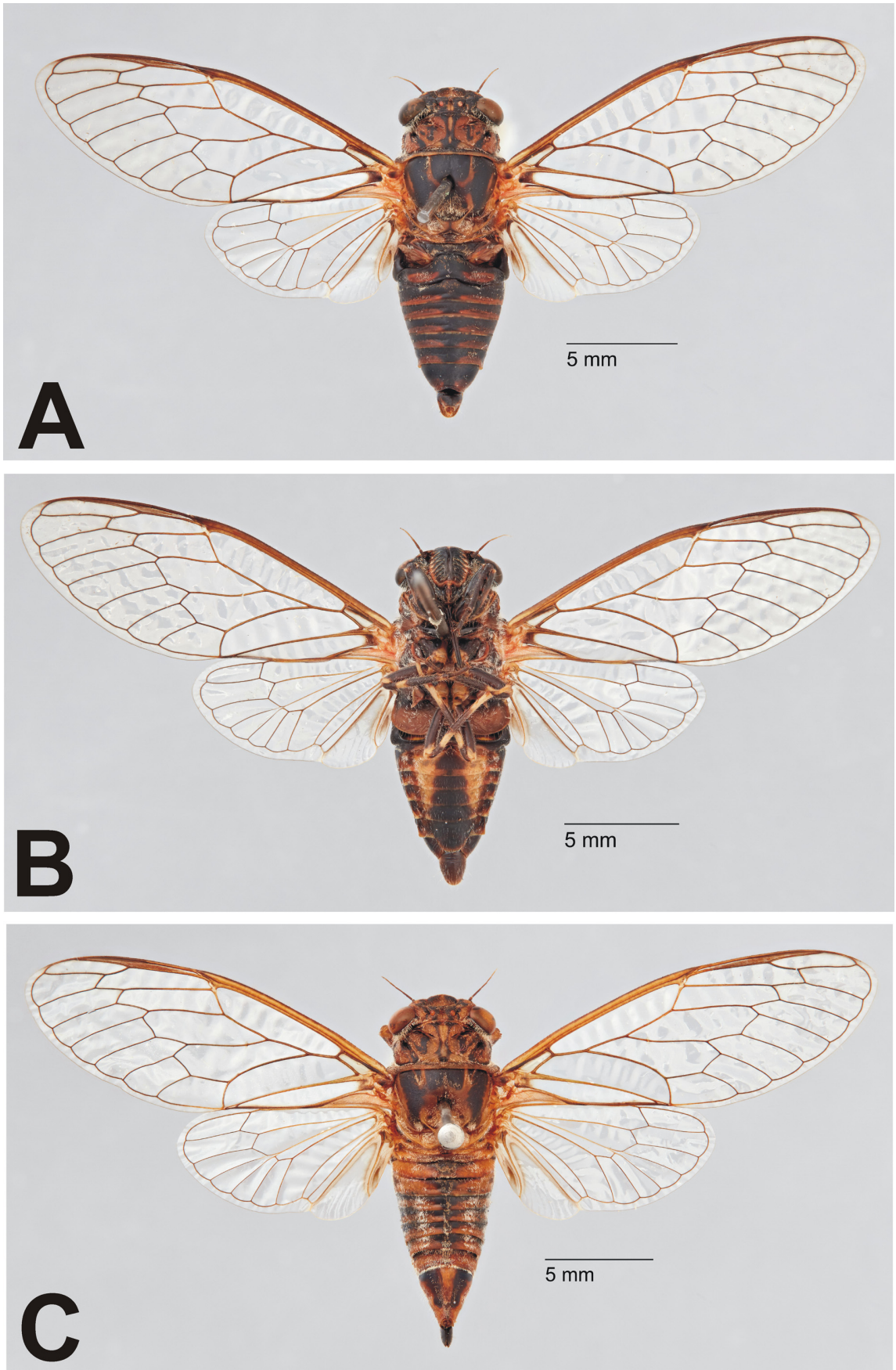

PLATE 10. *Myopsalta melanobasis* **n. sp.**: (A) male holotype, 14.6 km W. of Drillham Creek (26°39'S 149°50'E), dorsal view; (B) male holotype, ventral view; (C) female paratype, 1 km E. of Brigalow township (27°00'S 150°48'E), dorsal view.

Legs: Fore coxae dark brown with pale brown edges; mid coxae brown with dark brown to black edges, joints pinkish-brown, pale brown apically; hind coxae pale brown, with dark brown longitudinal markings on all sides; meracantha spikes pale brown, dark brown at base, overlapping opercula; fore femora dark brown with pale brown longitudinal areas on anterior and outer sides, pale brown apically; mid femora brown with dark brown to black longitudinal markings on anterior and posterior sides, pale brown apices; hind femora brown, sometimes pale brown basally and apically; fore tibiae dark brown; mid tibiae brown, each with two pale brown bands, one above base, another near apex; hind tibiae pale brown with a single brown band centrally; fore tarsi pale brown to brown; mid and hind tarsi pale brown; pretarsi and claws brown.

Opercula (Fig. 1J): Broadly rounded; dark brown to black over basal half, brown over remainder; plates undulating, medial areas weakly depressed.

Timbals (Fig. 21B): Anterior rib 5 abbreviated; rib 4 also abbreviated, with a prominent isolated remnant extension ventrally; ribs 1 and 2 joined ventrally and fused dorsally to basal spur; anterior termination of basal spur fused with ribs 3–4, with rib 5 unattached; prominent intercalary short ribs in medial areas between ribs 1 and 2, 2 and 3, and 3 and 4 (three in total).

Abdomen: Tergite 1 dark brown to black; tergite 2 wider along dorsal midline than tergites 3 to 7, black with brown markings dorso-laterally on posterior half; tergites 3 to 8 black, or dark brown in palest specimens, with broad brown areas on dorso-lateral posterior margins, all with dense short golden pubescence on medial areas, silver pubescence on dorso-lateral sides and with extensive long and short silver pubescence on lateral sides; epipleurites mixed brown and dark brown, with orange-brown to pinkish-brown infusions in some specimens, sparse silver pubescence; sternite II black, brown to pale brown ventro-laterally; sternites III to VI pale brown laterally, with dark brown areas medially, which broaden slightly posteriorly, gradually increasing in size distally in each successive sternite; sternite VII dark brown; sternite VIII dark brown; anterior sternites visible in lateral view.

Genitalia (Figs 22C, D): Pygofer dark brown anteriorly, becoming brown to pale brown posteriorly; upper lobes in ventral view enclosing uncus, with terminals directed dorsally, broadly tapering; basal lobes in ventral and lateral views gradually curved, slightly expressed; median lobe of uncus rounded, relatively narrow; claspers in ventral view conspicuous, weakly diverged, with acute apices; pseudoparameres projecting further (ventrally) than endotheca and ventral support; ventral support acute, projecting slightly beyond endotheca; endotheca fleshy.

Female (Plate 10C): Wings match description of male.

Head: Postclypeus predominantly pale brown, dorsal side with black anterior-lateral edges; transverse grooves black; supra-antennal plates brown; genae brown to pale brown; mandibular plates dark brown to black, covered by silvery pubescence; frons black; vertex brown to pale brown with areas of dark brown to black colouration, especially surrounding the ocelli; vertex and frons with sparse silvery pubescence; ocelli pink; compound eyes brown; anteclypeus pale brown, black laterally; rostrum brown, dark brown apically, extending to posterior margins of mid coxae; antennae dark brown.

Thorax: Pronotum brown to pale brown, median lateral areas with a diffuse network of dark brown markings; central fascia pale brown, surrounded with dark brown colouration; pronotal collar mostly brown to pale brown, tending dark brown to black anteriorly and on margins of lateral angles; metanotum brown; mesonotum brown to pale brown; submedian and lateral sigilla dark brown; cruciform elevation and wing grooves pale brown; posterior quarter of mesonotum with dense fine and sparse long silver pubescence.

Legs: Fore coxae brown; mid and hind coxae pale brown each with a dark brown marking anteriorly; meracantha spikes pale brown; fore femora pale brown with dark brown longitudinal areas on anterior and outer sides; mid and hind femora pale brown with brown longitudinal markings on anterior and posterior sides; fore tibiae brown; mid and hind tibiae pale brown; tarsi pale brown; pretarsi and claws brown.

Abdomen: Tergite 1 brown to pale brown; tergites 2 to 8 brown, with dark brown central markings extending along anterior dorso-lateral margins; tergites 7 and 8 with conspicuous long silver pubescence; auditory capsules black; abdominal segment 9 brown, pale brown medially, with dark brown to black dorso-lateral markings; dorsal beak black, sharply defined; sternite II pale brown; epipleurites brown to pale brown; sternites III to VI pale brown with relatively narrow dark brown to black areas medially, often broadening posteriorly; sternite VII pale brown; ovipositor sheath extends approximately 1.0 mm beyond apex of abdominal segment 9.

Measurements. N=13♂ 2♀. Ranges and means (in parentheses), mm; BL: ♂ 13.6–15.2 (14.2); ♀ 14.9–15.6 (15.3). FWL: ♂ 14.9–17.2 (16.2); ♀ 17.0–17.8 (17.4). HW: ♂ 4.2–4.7 (4.5); ♀ 4.5–4.6 (4.6). PW: ♂ 4.1–4.9 (4.5); ♀ 4.8–4.9 (4.9). AW: ♂ 4.3–5.1 (4.9); ♀ 4.6–4.8 (4.7). FWL/W: ♂ 2.52–2.81 (2.70); ♀ 2.69–2.76 (2.73). OL: ♀ 5.0–5.7 (5.4).

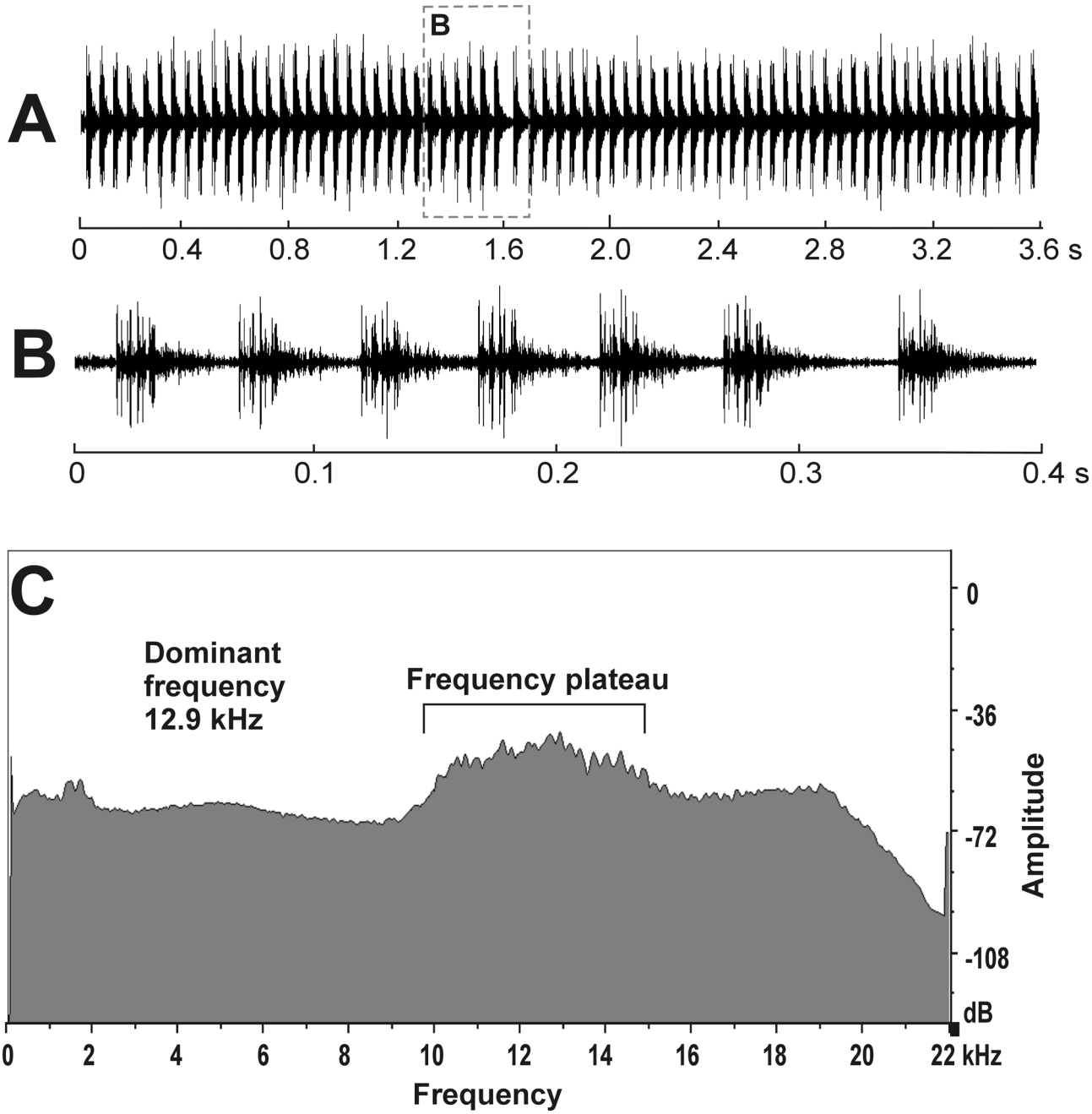

FIGURE 24. Male calling song structure of *Myopsalta melanobasis* **n. sp.** from a recording obtained at MacLagan (27°05'S 151°38'E) by the author using RS2 (see Methods). (A) Wave plot showing a series of short macrosyllables, which are marginally displaced on two occasions by slightly longer gaps between the macrosyllables. (B) wave plot showing the detailed structure of six short macrosyllables with gaps of increased duration following the last two macrosyllables. (C) Spectrogram showing the highest amplitude frequency plateau and dominant frequency.

Morphological distinguishing features. *Myopsalta melanobasis* **n. sp.** can be distinguished from all other species in the genus *Myopsalta*, apart from *M. coolahensis*, *M. libritor*, *M. platyptera* **n. sp.** and some individuals of *M. parvula* **n. sp.** by the appearance of the bases of the fore wing clavi, which are partially opaque dark brown rather than entirely hyaline. It can be distinguished from *M. coolahensis* and *M. libritor* by the colour of the basal membranes of the fore wings, which is orange rather than white. It can be separated from *M. parvula* **n. sp.** by having a fore wing length >14.8 mm and also by the partly brown (as opposed to completely black) colouration of the tergites. It can be distinguished from *M. leona* **n. sp.** by the appearance eof the distal corner of the fore wing basal cell (adjacent to the costa and radial cell), which is partly translucent brown to dark brown and not entirely hyaline. It is almost identical in appearance to *M. platyptera* **n. sp.** and indeed the females are indistinguishable.

However the males can be separated by the colouration of the lateral sides of tergite 8, which is dark brown to black, especially on the anterior half (c.f. diffusely brown in *M. platyptera* **n. sp.**).

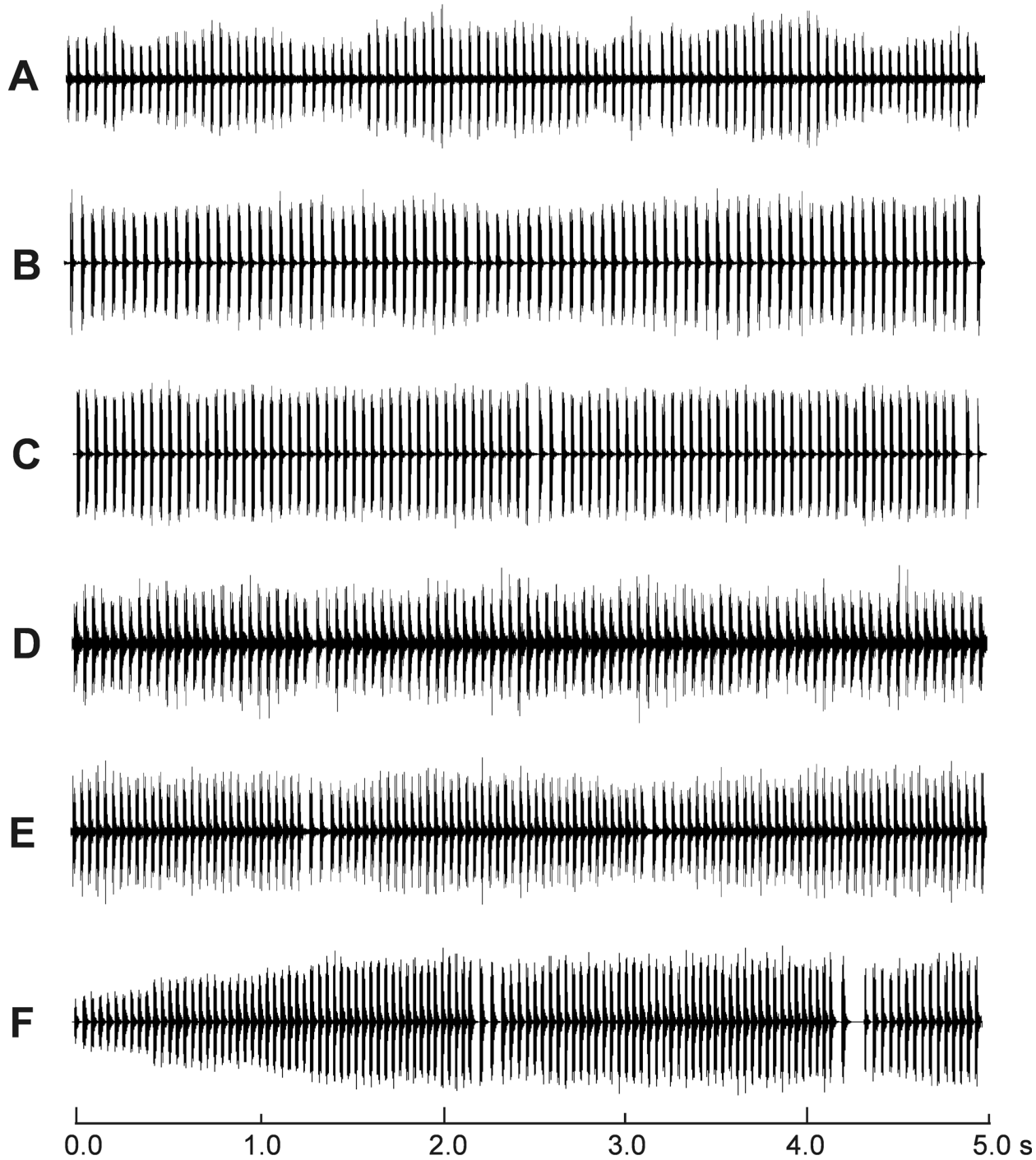

FIGURE 25. Wave plots illustrating the calling song of *Myopsalta melanobasis* **n. sp.** from six different locations, including (A) Southwood (27°48'S 150°05'E), (B) Brigalow (27°00'S 150°48'E), (C) 14.6 km W. of Drillham Creek (26°39'S 149°50'E), (D) Maclagan (27°05'S 151°38'E), (E) 20 km S. of Taroom (25°47'S 149°52'E), (F) approximately 28 km W. of Injune (25°48'S 148°20'E). Recordings were obtained by the author using RS1 (A), RS2 (D) and RS5 (E), by A. Ewart using RS3 (B, C) and by D. Marshall and K. Hill using RS7 (F) (see Methods).

Distribution, habitat and behaviour (Fig. 17). *Myopsalta melanobasis* **n. sp.** is known only from south-east Queensland in the area bordered by Drillham in the west, near Taroom in the north, Southwood National Park in the south and the township of Brigalow in the east. Populations occur perhaps exclusively in association with Brigalow (*Acacia harpophylla*), which grows in dark, cracking clay soils. Adults have been found from October to

January. Males sing in bursts during warm sunny conditions. They typically sit on twigs and thin branches amongst foliage.

Calling song (Figs 24, 25). When calling, males produce a rapid and fairly constant emission of short macrosyllables (0.012–0.021 s duration), evenly spaced by gaps (0.027–0.041 s duration), giving an overall rate of repetition of 18–24 macrosyllables per second. Close examination of the calling song reveals that the bursts of macrosyllables are occasionally interrupted by a longer gap of 0.05–0.11 s duration. It is postulated that the female would respond with a wing-flick during the longest examples of these gaps, which are typically preceded by a single isolated macrosyllable (e.g. Fig. 25f).

This species calls during the day and it is not known whether it also sings at dusk. The calling song maintains an even frequency distribution throughout, with a high amplitude plateau of 9.6–15.1 kHz and a dominant frequency of approximately 11.2–13.9 kHz.

***Myopsalta parvula* n. sp.**
(Figs 1K, 17, 21C, 22E, 22F, 26; Plate 11)

Types. **Holotype**: ♂ Australian Capital Territory, Frith Street, Acton, 35°16'14"S 149°06'48"E, 18.xi.2010, L.W. Popple, 675-0007, LT2009371, ANIC Database No. 20-014382 **(ANIC)**; **Paratypes**: AUSTRALIAN CAPITAL TERRITORY: 1♀ same data as holotype, 675-0008, ANIC Database No. 20-014383 (**ANIC**); 1♂ same data as holotype, 675-0005 (**QM**); 5♂ 1♀ Frith Rd, O'Connor, 35°16.07'S 149°06.32'E, 22.xi.2010, Emery & Popple; 1♂ Frith Rd, O'Connor, 35°16.074'S 149°06.32'E, 26.xi.2016, D. & C. Emery (**DE**); 6♂ same data as holotype, 675-0001 to 675-0004; 675-0006 (**LWP**); VICTORIA: 1♂ AU.VI.ARE, E. of Anglers Rest, 20.2km N. of Omeo, Alpine National Park, 37°00.288'S 147°31.334'E, 775m, 24.xi.2006, D. Marshall, K. Hill, 1♂ same data as previous, C. Simon Lab Voucher, legs in ETOH, body pinned, 06.AU.VI.ARE.01, 'Notopsalta alpine'; 1♂ same data as previous, 06.AU.VI.ARE.02 (**MSM**).

Etymology. The feminine form of the Latin adjective *parvulus*, meaning 'small'. This refers to the unusually small size of this species by comparison with other *Myopsalta* species in south-eastern Australia.

Description. Male. (Figs 1K, 21C, 22E, 22F; Plates 11A, 11B).

Head: Postclypeus predominantly black, reddish-brown to orange-brown along lateral margins and with an orange-brown area medially when viewed from anterior side; supra-antennal plates black; genae and mandibular plates black, covered by silvery pubescence; frons black; vertex black with a brown area extending along epicranial suture from between lateral ocelli to posterior margin; vertex and frons with sparse silvery pubescence; ocelli pale red; compound eyes brown; anteclypeus black; rostrum dark brown, black apically, extending beyond posterior margins of mid coxae; antennae dark brown to black.

Thorax: Pronotum dark brown, with black colouration along medial line broadening towards anterior and posterior pronotal margins; interior pronotum with irregular black patches near paramedian and lateral fissures; narrow black areas present along lateral margins; pronotal collar black, with dark brown dorso-lateral posterior margins; metanotum dark brown to black; mesonotum, including submedian and lateral sigilla, black, with dark brown areas on lateral sides of cruciform elevation; posterior third of mesonotum with dense fine and mid-dense long silver pubescence.

Wings: Fore wings hyaline; basal membranes pale orange to pale grey; pterostigmata reddish-brown; proximal tenth of clavi often partly opaque, dark brown; costal vein brown to reddish-brown; other veins dark brown. Hind wing plagas and jugal folds dark grey, apices hyaline; veins brown basally, dark brown on distal half.

Legs: Joints pale red; coxae and femora dark brown; meracantha spikes pale brown apically, dark brown at base, overlapping opercula; fore tibiae dark brown; mid tibiae dark brown, each with a brown band above the base; hind tibiae dark brown, each with two pale brown bands, one above base, other towards apex; fore tarsi dark brown; mid and hind tarsi brown; pretarsi and claws brown.

Opercula (Fig 1K): Broadly rounded; dark brown basally, grading to pale brown on margins of outer plates; plates undulating, with medial areas strongly depressed.

Timbals (Fig. 21C): Anterior rib 5 abbreviated; rib 4 also abbreviated, with a prominent isolated remnant extension ventrally; ribs 1 and 2 joined ventrally and fused dorsally to basal spur; anterior termination of basal spur fused with ribs 3–4, with rib 5 unattached; prominent intercalary short ribs in medial areas between ribs 1 and 2, 2 and 3, and 3 and 4 (three in total).

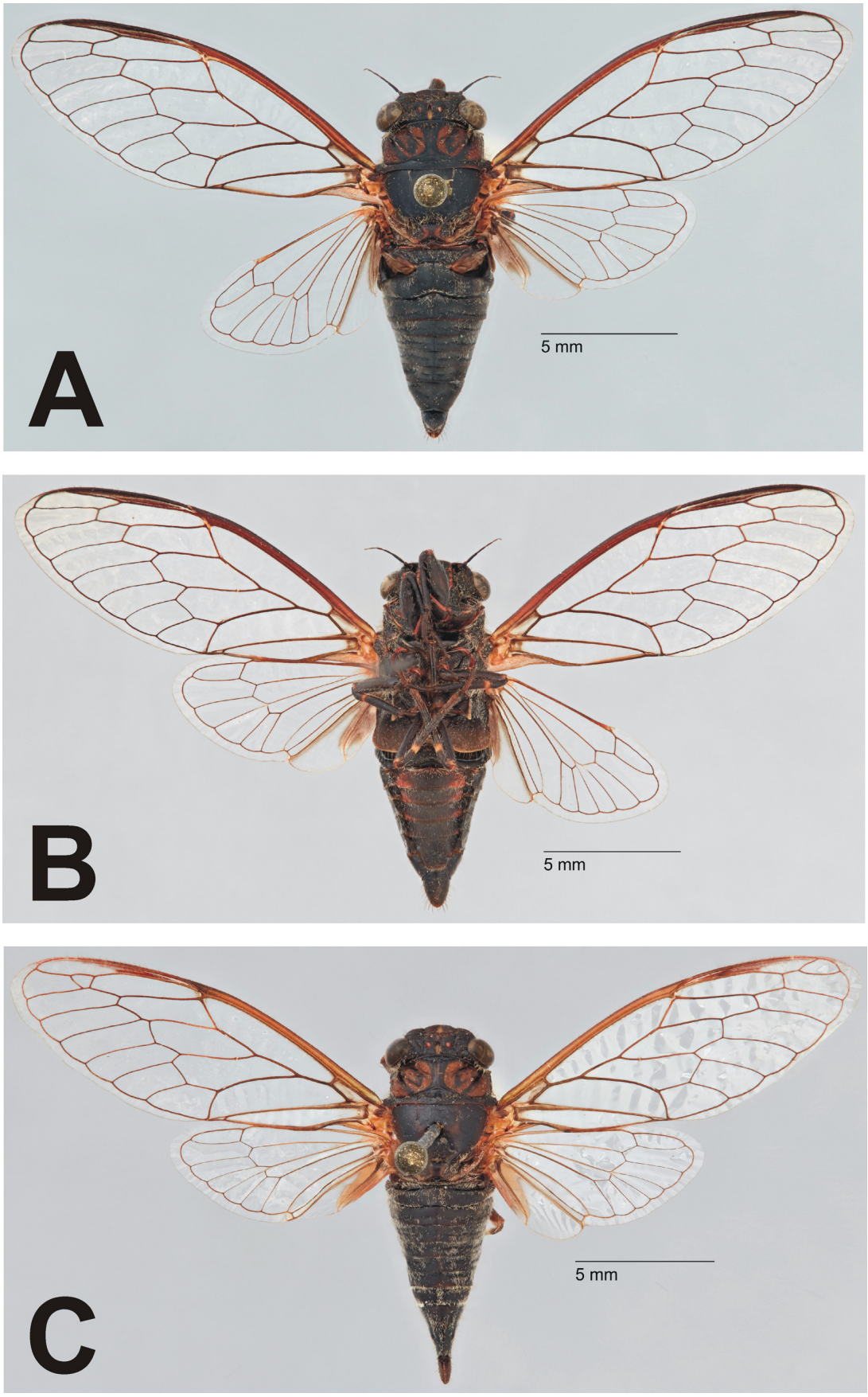

PLATE 11. *Myopsalta parvula* **n. sp.**: (A) male holotype, Acton (35°16'S 149°07'E), dorsal view; (B) male holotype, ventral view; (C) female paratype, same locality as holotype, dorsal view.

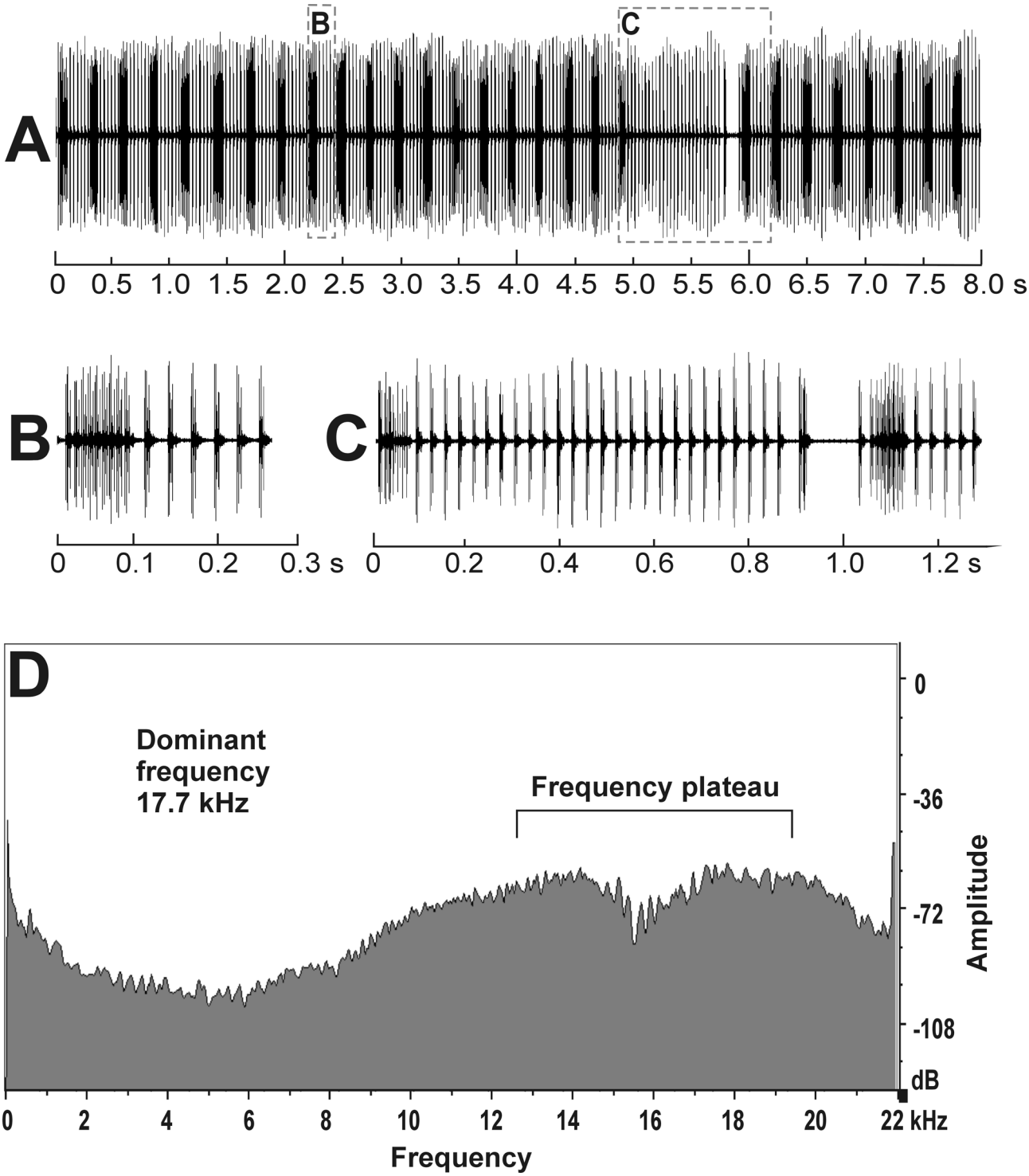

FIGURE 26. Male calling song structure of *Myopsalta parvula* **n. sp.** from a recording obtained at Acton (35°16'S 149°07'E) by the author using RS5 (see Methods). (A) Wave plot showing one complete song phrase, (containing 20 subphrases, a concluding syllable sequence and a final short macrosyllable) followed by the beginning of the next phrase. (B) Expanded wave plot showing the structure of a single subphrase, including a long macrosyllable and subsequent sequence of six syllables. (C) Expanded wave plot showing the end of a phrase, including a long macrosyllable, longer syllable sequence and the final short macrosyllable; this is followed by the first subphrase of the next phrase. (D) Spectrogram showing the highest amplitude frequency plateau and dominant frequency.

Abdomen: Tergites 1–8 black, with a sparse covering of silver pubescence; intersegmental membranes brown to pale brown; epipleurites dark brown to black, covered with long silver pubescence; sternite II dark brown to black; sternites III, IV and sometimes V dark brown to black, with narrow, pale brown to reddish-brown areas laterally; remaining sternites dark brown to black; anterior sternites visible in lateral view.

Genitalia (Figs 22E, F): Pygofer dark brown to black; upper lobes in ventral view relatively linear, with terminals directed dorsally and tapering broadly; basal lobes in ventral view relatively linear, in lateral view slightly curved and weakly expressed; median lobe of uncus rounded, protruding gradually; claspers in ventral view conspicuous, diverging gradually from point of downward deflection, with fairly blunt apices; pseudoparameres projecting further (ventrally) than endotheca and ventral support; ventral support acute, projecting slightly beyond endotheca; endotheca fleshy.

Female (Plate 11C): Head, thorax, wings and legs match description of male.

Abdomen: Tergites 1–8 black, with a sparse covering of silver pubescence; abdominal segment 9 black; dorsal beak black, sharply defined; intersegmental membranes pale brown; sternite II black; epipleurites black; sternites III to VI dark brown, with reddish-brown wedge-shaped patterns extending to lateral edges and broadening posteriorly; sternite VII pale brown laterally, grading to dark brown submedially; ovipositor sheath extends <0.5 mm beyond apex of abdominal segment 9.

Measurements. N=7♂ 1♀. Ranges and means (in parentheses), mm; BL: ♂ 11.2–14.1 (12.33); ♀ 12.8–13.0 (12.90). FWL: ♂ 12.3–14.7 (13.67); ♀ 13.5–13.7 (13.60). HW: ♂ 3.5–4.4 (3.81); ♀ 3.7–3.9 (3.80). PW: ♂ 3.5–4.4 (3.78); ♀ 3.5–3.9 (3.70). AW: ♂ 3.5–4.6 (4.09); ♀ 3.2–3.6 (3.40). FWL/W: ♂ 2.49–3.04 (2.70); ♀ 2.74–2.76 (2.75). OL: ♀ 4.5–4.8 (4.65).

Morphological distinguishing features. *Myopsalta parvula* **n. sp.** can be distinguished from *M. binotata*, *M. lactea* and *M. waterhousei* by having fore wings that are hyaline, without apparent melanisms or infuscations on any veins. It can also be separated from these species, as well as from *M. coolahensis*, *M. libritor* and *M. wollomombii* by the colour of the plaga of each hind wing, which is grey-brown rather than white. Additionally, males and females can be separated from *M. albiventris*, *M. coolahensis* and *M. wollomombii* by the colouration of the sternites, being predominantly dark brown to black (cf. almost entirely pale brown in those three species). They can be distinguished from *M. melanobasis* **n. sp.** and *M. platyptera* **n. sp.** by having a fore wing length <14.8 mm and also by the colouration of the tergites being entirely black and not partly brown. They can be differentiated from *M. umbra* **n. sp.** by the colour of the costa and tergites, which is brown and black, respectively, rather than reddish-brown, and from *M. atrata* by having dark brown (not contrasting orange yellow-brown) abdominal intersegmental membranes. Males can be distinguished from *M. chrysopedia* **n. sp.**, *M. longicauda* **n. sp.**, *M. majurae* **n. sp.** and *M. riverina* **n. sp.** by having a head width of <4.7 mm. They can be distinguished from *M. bassiana* **n. sp.**, *M. crucifera*, *M. gordoni* **n. sp.**, *M. leona* **n. sp.**, *M. mackinlayi* and *M. septa* **n. sp.** by the colouration of sternite III, which is almost entirely dark brown to black. Females can be distinguished from *M. bassiana* **n. sp.**, *M. chrysopedia* **n. sp.**, *M. crucifera*, *M. gordoni* **n. sp.**, *M. mackinlayi*, *M. leona* **n. sp.**, *M. longicauda* **n. sp.**, *M. septa* **n. sp.** and *M. xerograsidia* **n. sp.** by the characteristically short length of the ovipositor sheath, which extends <0.5 mm beyond the apex of abdominal segment 9.

Distribution, habitat and behaviour (Fig. 17). *Myopsalta parvula* **n. sp.** is currently known only from a small area on the lower eastern slopes of Black Mountain in the Australian Capital Territory and from near Anglers Rest, approximately 20 km north of Omeo in north-eastern Victoria. Adults occur for a period of approximately one week from mid-November. The Australian Capital Territory specimens were found in low shrubs and grass on the edge of eucalypt woodland. Males call from the stems of grasses and shrubs during warm, sunny conditions.

Calling song (Fig. 26). Examination of the calling song of *M. parvula* **n. sp.** reveals the phrase durations to be quite variable, often prolonged. From a small sample of available recordings (n=2), phrase durations ranged from 3.7 s to >47 s and this variation was a consequence of the number of smaller subphrases incorporated into each phrase. Each subphrase comprises a long macrosyllable (0.05–0.08 s duration; sometimes preceded by a syllable and gap of 0.007–0.008 s and 0.008–0.017 s duration, respectively), a gap of 0.020–0.025 s duration and a syllable sequence (0.12–0.19 s duration, containing 5–7 syllables separated by gaps of 0.020–0.025 s duration). Each phrase concludes with a drawn out syllable sequence (0.5–1.0 s duration, containing 18–35 syllables), followed by a gap (0.039–0.042 s duration), a short macrosyllable (0.017–0.022 s duration) and a longer gap (0.10–0.12 s duration). Based upon the observations of the calling behaviour in other *Myopsalta* species, it is considered likely that the female would respond with a wing-flick signal during the long gap at the end of each phrase.

The calling song maintains an even frequency distribution throughout, with a high amplitude plateau of 12.9–19.3 kHz and a dominant frequency between 13.1 and 17.7 kHz.

***Myopsalta platyptera* n. sp.**
(Figs 1L, 17, 21D, 22G, 22H, 27; Plate 12)

Types. **Holotype**: ♂ Brigalow Res. Stn. nr. Theodore, S.E.Q., western brigalow, 17 Dec 2000, A.E., 24°49.22'S 149°44.94'E, QM Reg. No. T239570 **(QM)**; **Paratypes**: QUEENSLAND: 1♀ same data as holotype (**QM**); 3♂ 3♀ same data as holotype; 4♂ 2♀ Brigalow Res. Stn. nr. Theodore, 24°47.93'S 149°45.45'E, N.W. brigalow section, 18.xii.2000, A. Ewart; 1♀ same data as previous, 21.xii.2000 (**AE**); 1♂ same data as holotype (**LWP**); 1♂ same data as holotype (**MSM**).

Etymology. A feminine Latinised compound adjective of the Greek words *platýs* and *pteros*, which translates to 'broad-winged', referring to the unusually broad, rounded wings found in most examples of this species.

Description. Male. (Figs 1L, 21D, 22G, 22H; Plates 12A, 12B).

Head: Postclypeus predominantly brown, ventral and lateral margins pale brown, transverse grooves dark brown; supra-antennal plates pale brown on ventral sides, dark brown on dorsal sides; genae dark brown to black; mandibular plates black with dark brown lateral margins, covered by silvery pubescence; frons black with dense silver pubescence; vertex black, with a pale brown area extending along epicranial suture from median ocellus to posterior margin; ocelli pink; compound eyes brown; anteclypeus black, pale brown medially; rostrum brown to dark brown, darker apically, extending to anterior margins of hind coxae; antennae dark brown to black.

Thorax: Pronotum brown; central fascia dull yellow-brown, surrounded with dark brown colouration, which broadens towards anterior and posterior pronotal margins; interior pronotum with irregular dark brown patches near paramedian and lateral fissures; lateral margins partly black; pronotal collar dark brown, with brown posterior margins; metanotum dark brown; mesonotum brown to ochraceous; submedian sigilla, lateral sigilla and lateral edges of pronotum dark brown to dark reddish-brown; posterior third of mesonotum with dense fine and sparse long silver pubescence.

Wings: Fore wings hyaline; basal membranes pale orange; pterostigmata brown; proximal tenth of clavi opaque, brown, hyaline over remainder; veins, including costal vein, pale brown to orange-brown, darker distally. Hind wing plagas white at base, with pale grey colouration extending along medial areas and jugal folds terminating before apices; hyaline over remainder; veins pale brown basally, brown over remainder.

Wings: Fore wings hyaline; basal membranes pale orange; pterostigmata brown; proximal tenth of clavi opaque, pale brown to brown, hyaline over remainder; veins, including costal vein, pale brown to orange-brown, darker distally. Hind wing plagas white at base, with pale grey colouration extending along medial areas and jugal folds terminating before apices; hyaline over remainder; veins pale brown basally, brown over remainder.

Legs: Fore coxae brown, dark brown on inner anterior sides; mid coxae pale brown with dark brown markings on anterior edges and dark brown on posterior side; hind coxae pale brown, with dark brown longitudinal markings on anterior and posterior sides; meracantha spikes pale brown, overlapping opercula; fore femora brown on anterior sides, pale brown on posterior sides, with broad, brown to dark brown longitudinal areas on all sides, pale brown apically; mid femora brown with dark brown to brown longitudinal markings on dorsal sides, pale brown apices; hind femora brown, pale brown basally and apically; fore tibiae brown to dark brown; mid tibiae brown, each with two pale brown bands, one above base, another near apex; hind tibiae pale brown to brown; fore tarsi pale brown to brown; mid and hind tarsi pale brown; pretarsi and claws brown to dark brown.

Opercula (Fig. 1L): Broadly rounded; partially dark brown over basal third, pale brown over remainder; plates undulating, medial areas weakly depressed.

Timbals (Fig. 21D): Anterior rib 5 abbreviated; rib 4 also abbreviated, with a prominent isolated remnant extension ventrally; ribs 1 and 2 joined ventrally and fused dorsally to basal spur; anterior termination of basal spur fused with ribs 3–4, with rib 5 unattached; prominent intercalary short ribs in medial areas between ribs 1 and 2, 2 and 3, and 3 and 4 (three in total).

Abdomen: Tergite 1 dark brown to black; tergite 2 wider along dorsal midline than tergites 3 to 7, black over medial half and laterally, otherwise reddish brown; tergite 3 black, lateral and dorso-lateral posterior sides reddish-brown; tergites 4–8 a diffuse brown or reddish-brown, with black areas medially, narrowing towards posterior margins and with diffuse black areas on anterior lateral sides; all tergites with dense short golden pubescence on medial areas, silver pubescence on dorso-lateral sides and with extensive long and short silver pubescence on lateral sides; epipleurites mixed brown and dark brown, with orange-brown to pinkish-brown infusions in some specimens, sparse silver pubescence; sternite II dark brown to black, brown to pale brown ventro-laterally; sternites

III to VI brown laterally and along posterior margins, with dark brown areas medially, which each increase in size distally in each successive sternite; sternite VII dark brown; sternite VIII brown; anterior sternites visible in lateral view.

Genitalia (Figs 22G, H): Pygofer dark brown anteriorly, tending black towards dorsal beak, becoming orange-brown to brown posteriorly; upper lobes in ventral view partially enclosing uncus, with terminals directed dorsally, broadly tapering; basal lobes in ventral and lateral views gradually curved, slightly expressed; median lobe of uncus rounded, relatively narrow; claspers in ventral view conspicuous, weakly diverged, with acute apices; pseudoparameres projecting further (ventrally) than endotheca and ventral support; ventral support acute, projecting slightly beyond endotheca; endotheca fleshy.

Female (Plate 12C). *Head*: Postclypeus predominantly pale brown, transverse grooves and anterio-lateral sides dark brown to black; supra-antennal plates pale brown, each with a dark brown area on dorsal sides; genae dark, pale brown laterally; mandibular plates dark brown to black, lateral margins pale brown, with silvery pubescence; frons dark brown; vertex brown to pale brown with areas of dark brown to black colouration, especially surrounding the ocelli; vertex and frons with sparse silvery pubescence; ocelli pink; compound eyes brown; anteclypeus black, pale medially; rostrum brown, dark brown apically, extending to anterior margins of hind coxae; antennae dark brown.

Thorax: Pronotum brown to pale brown, median lateral areas with a diffuse network of dark brown markings; central fascia pale brown, surrounded with dark brown colouration; pronotal collar brown to pale brown; metanotum dark brown to black; mesonotum brown to pale brown; submedian and lateral sigilla dark brown; posterior fifth of mesonotum with dense fine and sparse long silver pubescence.

Legs: Fore coxae brown, pale brown on outer edges, with a dark brown longitudinal marking on outer posterior sides; mid and hind coxae pale brown each with a dark brown marking anteriorly; meracantha spikes pale brown; fore femora pale brown with dark brown longitudinal areas on anterior and outer sides; mid and hind femora pale brown with dark brown longitudinal markings on anterior and posterior sides; fore and mid tibiae brown to dark brown; hind tibiae pale brown; tarsi pale brown; pretarsi and claws brown.

Abdomen: Tergite 1 black medially, grading to pale brown on lateral sides; tergites 2 to 8 brown, with dark brown central markings extending along anterior dorso-lateral margins and medially to posterior margins; tergites 7 and 8 with conspicuous long silver pubescence; auditory capsules dull brown; abdominal segment 9 brown, paler ventrally, with dark brown dorso-lateral markings; dorsal beak black, sharply defined; sternite II pale brown; epipleurites brown; sternites III to VI pale brown with dark brown to black areas medially, often broadening posteriorly; sternite VII pale brown; ovipositor sheath extends <1.0 mm beyond apex of abdominal segment 9.

Measurements. N=9♂ 5♀. Ranges and means (in parentheses), mm; BL: ♂ 13.1–14.8 (14.00); ♀ 15.0–16.0 (15.22). FWL: ♂ 15.7–17.1 (16.60); ♀ 16.6–17.4 (17.00). HW: ♂ 4.2–4.6 (4.39); ♀ 4.4–4.7 (4.56). PW: ♂ 4.2–4.8 (4.52); ♀ 4.6–4.8 (4.70). AW: ♂ 4.3–4.9 (4.71); ♀ 4.6–4.7 (4.62). FWL/W: ♂ 2.73–3.25 (2.97); ♀ 2.63–2.90 (2.79). OL: ♀ 4.8–5.3 (5.04).

Morphological distinguishing features. *Myopsalta platyptera* **n. sp.** can be distinguished from all other species in the genus *Myopsalta*, apart from *M. coolahensis*, *M. libritor*, *M. melanobasis* **n. sp.** and some individuals of *M. leona* **n. sp.** and *M. parvula* **n. sp.** by the appearance of the bases of the fore wing clavi, which are partially opaque dark brown rather than entirely hyaline. It can be distinguished from *M. coolahensis* and *M. libritor* by the colour of the basal membranes of the fore wings, which is orange rather than white. It can be separated from *M. parvula* **n. sp.** by having a fore wing length >14.8 mm and also by the brown or reddish-brown (as opposed to completely black) colouration of the tergites. It can be distinguished from *M. leona* **n. sp.** by the appearance eof the distal corner of the fore wing basal cell (adjacent to the costa and radial cell), which is partly translucent brown to dark brown and not entirely hyaline. It is almost identical in appearance to *M. melanobasis* **n. sp.** and indeed the females are indistinguishable. However the males can be separated by the colouration of the lateral sides of tergite 8, which is diffusely brown to reddish-brown (c.f. black in *M. melanobasis* **n. sp.**).

Distribution, habitat and behaviour (Fig. 17). *Myopsalta playptera* **n. sp.** is known only from the original specimens collected by A. Ewart on a former Queensland Government experimental property known as Brigalow Research Station, which is located south of Moura on the junction of central and south-eastern Queensland. Populations occur in association with Brigalow (*Acacia harpophylla*), where it grows in dark, cracking clay soils. Adults have been collected during December. Males sing during warm conditions.

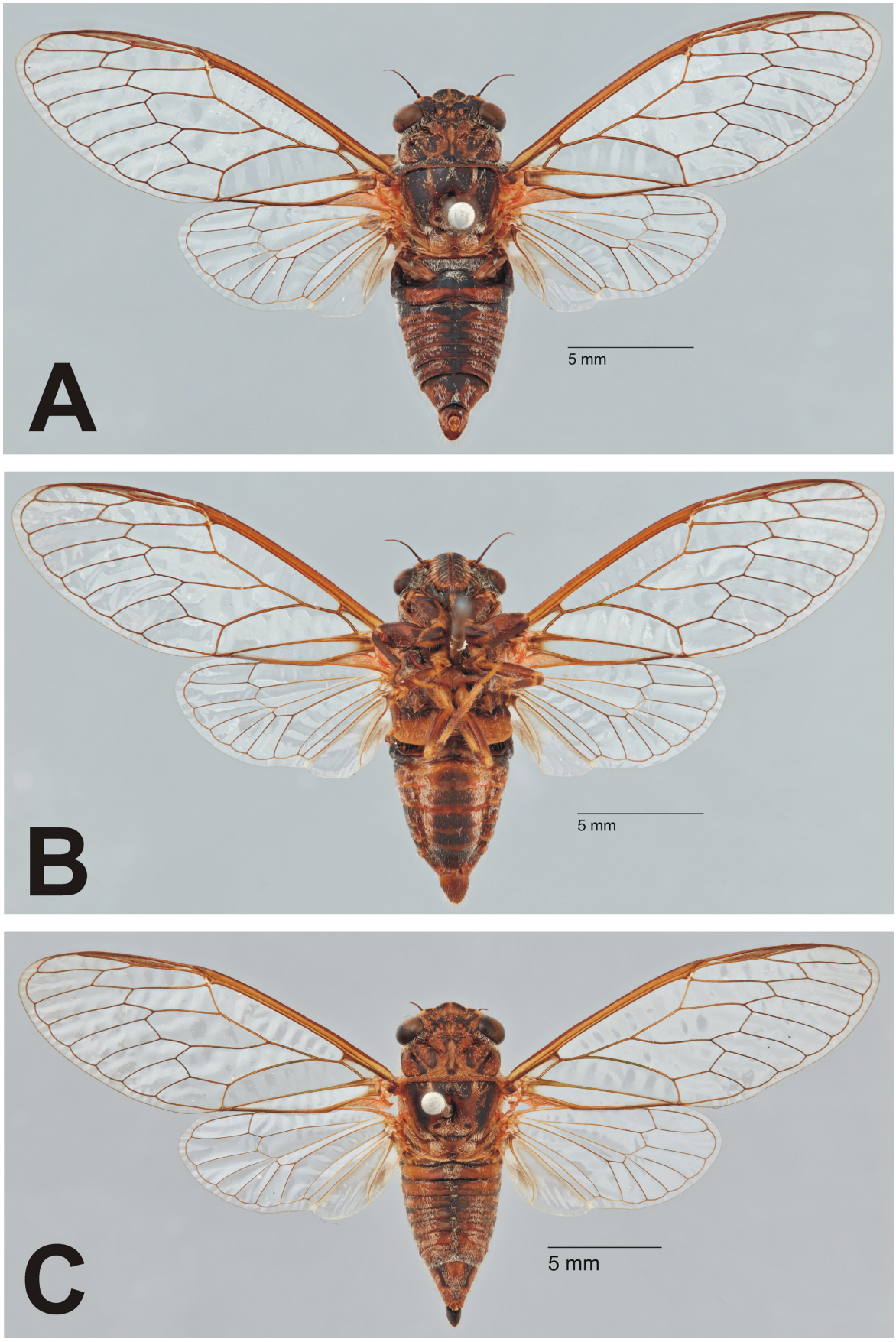

PLATE 12. *Myopsalta platyptera* **n. sp.**: (A) male holotype, Brigalow Research Station (24°49'S 149°45'E), dorsal view; (B) male holotype, ventral view; (C) female paratype, same locality as holotype, dorsal view.

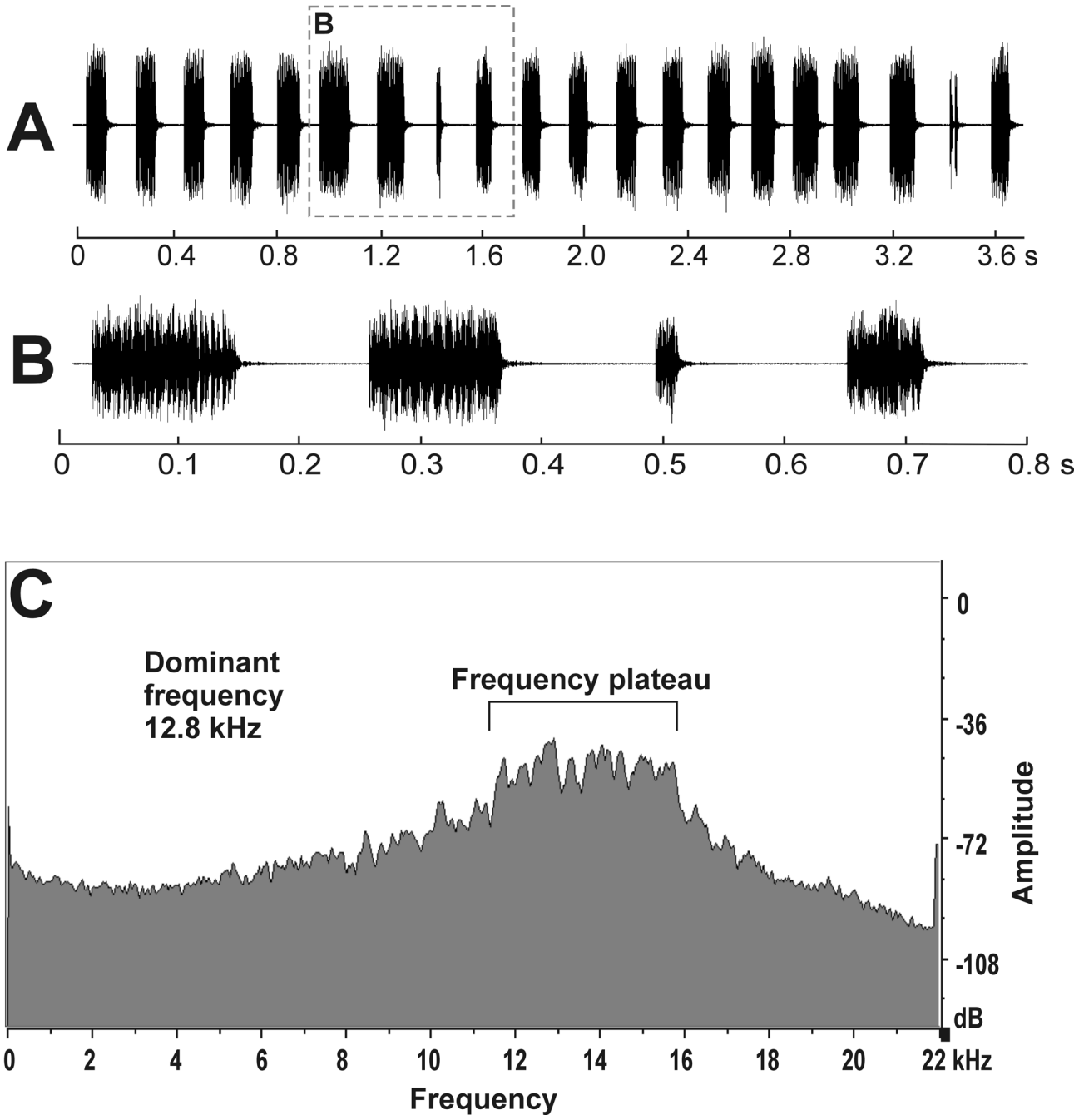

FIGURE 27. Male calling song structure of *Myopsalta platyptera* **n. sp.** from a recording obtained at Brigalow Research Station (24°49'S 149°45'E) by A. Ewart using RS3 (see Methods). (A) Wave plot showing a series of short echemes (or long macrosyllables), interrupted on two occasions by a short macrosyllable. (B) Wave plot showing the detailed structure of two short echemes, a short macrosyllable and a long macrosyllable. (C) Spectrogram showing the highest amplitude frequency plateau and dominant frequency.

Calling song (Fig. 27). Males produce a sequence of long macrosyllables or short echemes (0.07–0.12 s duration), evenly spaced by gaps (0.11–0.13 s duration), giving an overall rate of repetition of 4–6 macrosyllables per second (all statistics, *n*=4 recordings). At sporadic intervals these macrosyllables or echemes are interrupted by a much shorter macrosyllable (0.02–0.03 s duration) followed by a slightly longer gap (0.13–0.14 s duration). It is considered likely that the female would respond with a wing-flick during these longer gaps.

This species calls during the day and it is not known whether it also sings at dusk. The calling song maintains an even frequency distribution throughout, with a high amplitude plateau of 11.6–15.7 kHz and a dominant frequency of approximately 12.8 kHz.

***Myopsalta riverina* n. sp.**
(Figs 1M, 21E, 22I, 22J, 28, 29; Plate 13)

Types. **Holotype**: ♂ AUSTRALIA NSW, 33 km SSW. of Rankins Springs, 20.xi.2010, L.W. Popple, D. Emery, 33°55'03"Sx145°56'25"E, 677-0001, Mallee, K.421150 **(AM)**; **Paratypes**: NEW SOUTH WALES: 1♂ same data as holotype, 677-0005 (**QM**); 1♂ same data as holotype, 677-0004 (**MSM**); 3♂ 20 km W. Rankin Springs 33°53.35'S 146°05.34'E, 19.xi.2010, Popple & Emery (**DE**); 2♂ same data as holotype, 677-0002, 677-0003 (**LWP**).

Etymology. The name (presented in the form of a feminine, Latin adjective) refers to the region of New South Wales in which this species was first discovered: the Riverina.

Description. Male. (Figs 1M, 21E, 22I, 22J; Plate 13).

Head: Postclypeus predominantly shiny black, lateral margins pinkish-brown, with a small brown triangular marking on dorsal side; supra-antennal plates black, anterior edges pinkish-brown; genae black; mandibular plates black, covered by long silvery pubescence; frons black; vertex black with a small brown area extending narrowly along epicranial suture from near median ocellus to near margin of pronotal, covered in sparse silver pubescence; ocelli pale red; compound eyes brown; anteclypeus shiny black; rostrum black, extending beyond posterior margins of mid coxae; antennae dark brown to black.

Thorax: Pronotum black with a broken pale brown central fascia and with diffuse dark reddish-brown colouration near paramedian and lateral fissures; pronotal collar black, with reddish-brown dorso-lateral posterior margins; metanotum black; mesonotum, including submedian and lateral sigilla, extensively black, with narrow reddish-brown to pale browm areas between submedian and lateral sigilla extending on to arms and lateral sides of cruciform elevation and posterior half of wing grooves; posterior third of mesonotum with dense fine and sparse long silver pubescence.

Wings: Fore wings hyaline; basal cells orange to pale orange-brown, becoming greyish distally; pterostigmata dark reddish-brown; veins, black, with some pale brown within the interior costal veins and clavical folds. Hind wing plagas white at base, grading to dark grey-brown along basal two thirds, this colour extending broadly along jugal folds and terminating before apices, hyaline over remainder; veins dark brown.

Legs: Fore coxae black, outer edges brown, apices pale brown to pinkish-brown; mid and hind coxae black, apices pale brown; meracantha spikes dark brown to black, becoming pale brown apically, overlapping opercula; fore femora black with pale brown longitudinal areas on outer anterior sides, apices pale brown, joints pinkish-brown; mid femora black, apices pale brown, joints pinkish-brown; hind femora dark brown to black, apices and joints pale brown; fore tibiae black; mid and hind tibiae dark brown, each with two pale brown bands, one above base, other towards apex; fore and mid tarsi dark brown; hind tarsi brown; pretarsi brown with dark brown apical areas; claws dark brown.

Opercula (Fig. 1M): Broadly rounded; dull black over basal half, dull brown over remainder; plates slightly undulating, medial areas weakly depressed.

Timbals (Fig. 21E): Anterior rib 5 abbreviated; rib 4 also abbreviated, with isolated, oval-shaped remnant extension ventrally; ribs 1 and 2 joined ventrally and fused dorsally to basal spur; anterior termination of basal spur fused with ribs 3–4, with rib 5 unattached; prominent intercalary short ribs in medial areas between ribs 1 and 2, 2 and 3, and 3 and 4 (three in total).

Abdomen: Tergite 1 black; tergite 2 wider along dorsal midline than tergites 3 to 7; tergites 2 to 7 black, all with dense short silver pubescence on dorso-lateral sides and with extensive long and short silver pubescence on lateral sides; tergite 8 black, covered in short silver pubescence; intersegmental membranes pale brown; epipleurites black, with sparse silver pubescence; sternite II black laterally, brown ventro-laterally, with a dark brown area medially, which broadens posteriorly; sternites III to V reddish-brown laterally, with dark brown to black areas medially, which broaden posteriorly, gradually increasing in size distally in each successive sternite; sternites VI and VII black with diffuse pale brown areas at extreme anterio-lateral margins; sternite VIII dark reddish-brown to black; anterior sternites visible in lateral view.

Genitalia (Figs 22I, J): Pygofer black dorsally, dark reddish-brown laterally; upper lobes in ventral view slightly undulating, with terminals directed inwards and tapering broadly; basal lobes in ventral view relatively linear, flat, in lateral view small, rounded and bulbous; median lobe of uncus rounded, exhibiting limited protrusion; claspers in ventral view conspicuous, diverging from point of downward deflection, with relatively

narrow apices; pseudoparameres projecting further (ventrally) than endotheca and ventral support; ventral support acute, projecting slightly beyond endotheca; endotheca partially sclerotised.

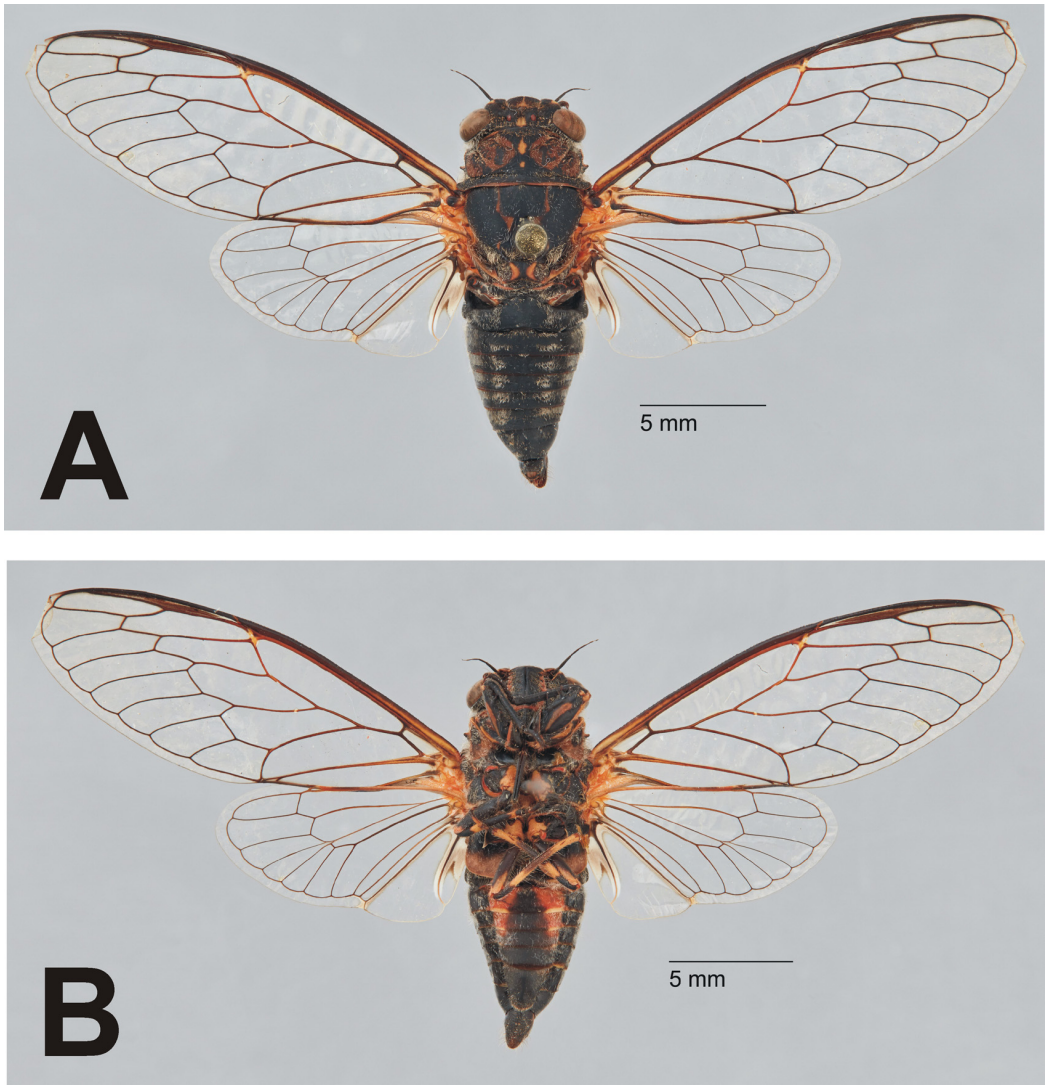

PLATE 13. *Myopsalta riverina* **n. sp.**: (A) male holotype, 33 km SSW. of Rankins Springs (33°55'S 145°56'E), dorsal view; (B) male holotype, ventral view.

Female: Unknown.

Measurements. N=8♂. Ranges and means (in parentheses), mm; BL: ♂ 15.1–16.5 (15.76). FWL: ♂ 18.0–19.2 (18.68). HW: ♂ 4.7–5.3 (5.03). PW: ♂ 4.7–5.7 (5.23). AW: ♂ 4.7–5.5 (5.19). FWL/W: ♂ 2.60–2.88 (2.76).

Morphological distinguishing features. Males of *Myopsalta riverina* **n. sp.** can be distinguished from *M. atrata*, *M. binotata*, *M. coolahensis*, *M. gordoni* **n. sp.**, *M. lactea*, *M. libritor*, *M. waterhousei* and *M. xerograsidia* **n. sp.** by the colour of the basal membranes of the fore wings, which is pale brown or pale orange rather than white to pale grey. They can be distinguished from *M. melanobasis* **n. sp.** and *M. platyptera* **n. sp.** by the appearance of the fore wing clavus, which is entirely hyaline and not opaque at the base. They can be separated from *M. albiventris* **n. sp.** and *M. wollomombii* by the colouration of the sternites, which is predominantly dark brown (cf. almost entirely pale brown). They can be differentiated from *M. umbra* **n. sp.** by the colour of the costal veins, which is dark brown rather than reddish-brown. They can be distinguished from *M. crucifera* **n. sp.**, *M. leona* **n. sp.**, *M. mackinlayi* **n. sp.**, *M. parvula* **n. sp.** and *M. septa* **n. sp.** by having a head width >4.6 mm. They can be distinguished from *M. chrysopedia* **n. sp.** by having a fore wing length/width ratio of <2.9 and from *M. longicauda* **n. sp.** by having tergites that are entirely black (not partly brown). They can be separated from *M. bassiana* **n. sp.** and *M. majurae* **n. sp.** by the colouration of the opercula, which is predominantly brown rather than dark brown to black.

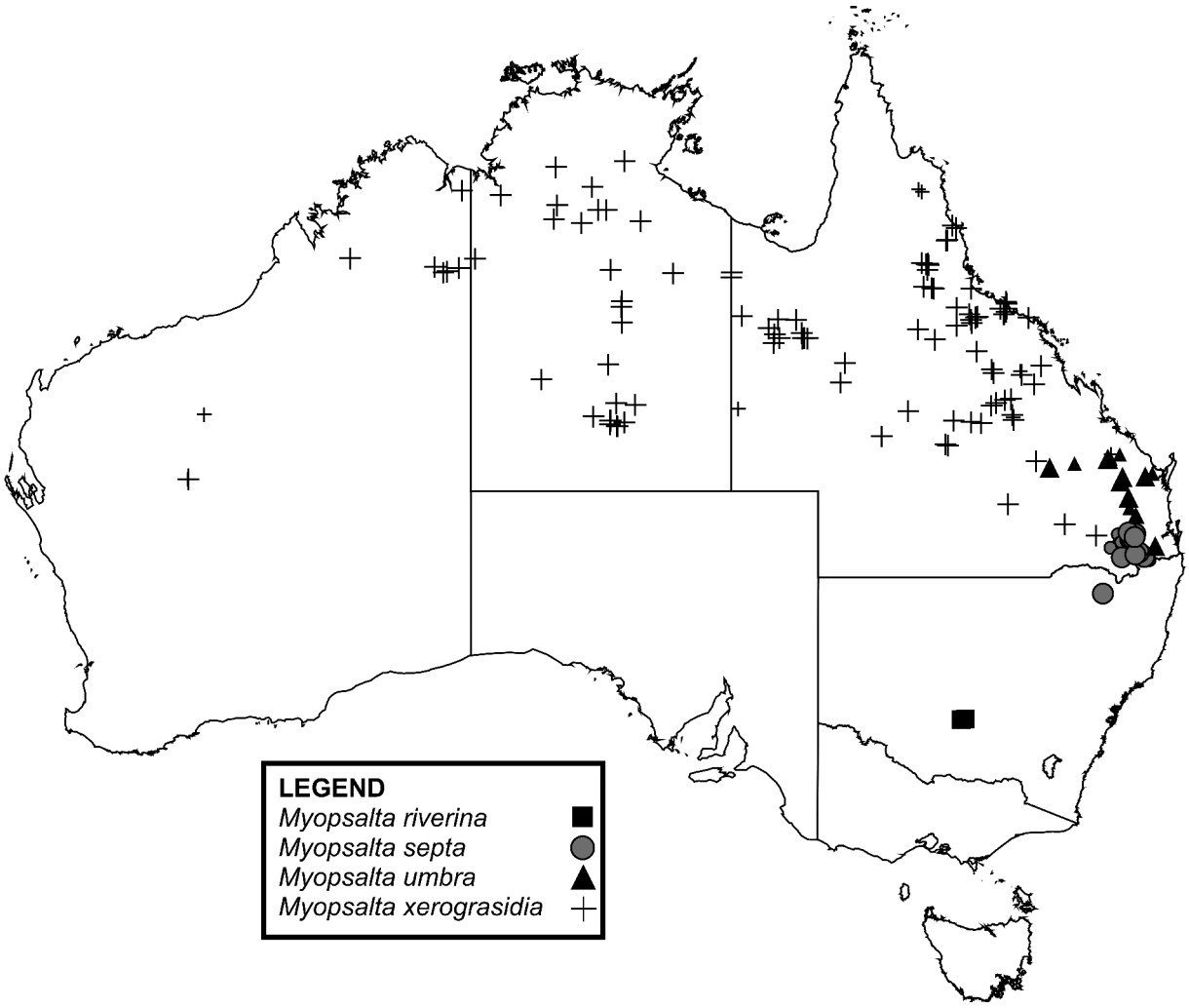

FIGURE 28. Map of mainland Australia showing the geographical distributions of *Myopsalta riverina* **n. sp.** in New South Wales, *M. septa* **n. sp.** in Queensland and New South Wales, *M. umbra* **n. sp.** in Queensland, and *M. xerograsidia* **n. sp.** in Queensland, the Northern Territory and Western Australia. Large symbols represent specimen records and smaller symbols denote audio recordings or aural observations.

Distribution, habitat and behaviour (Fig. 28). *Myopsalta riverina* is known only from the original specimens collected by the author and David Emery from 33 km SSW. of Rankins Springs (east of Goolgowi) in southern inland New South Wales. Adults have been found in roadside Mallee (*Eucalyptus socialis* and *E. dumosa*) on weathered red soils, during mid November. Males sing sporadically during warm, sunny conditions. Like many cicadas that inhabit mallee woodland, they call infrequently on hot days.

Calling song (Fig. 29). To the ear, the song of *M. riverina* appears to contain monotonously repeated long echemes, each increasing slightly in amplitude throughout and each separated by short sequences of macrosyllables. Detailed examination of three available recordings reveals that the echemes are organised collectively into phrases of quite variable duration. Indeed each phrase contains 2 to 60 (or more) echemes (1.0–1.5 s duration), each separated by gaps (0.17–0.38 s duration). The gaps are typically not silent, instead containing 3–7 macrosyllables (0.02–0.06 s duration, 2–4 syllables, with the syllables themselves not coalesced). The end of the phrase is signified by a short gap of approximately 0.04 s duration followed by a long macrosyllable (0.07–0.09 s duration) and a longer gap (0.10–0.12 s duration) (all statistics, n=17 recordings). Following the stereotypical structure of male-female communication in this group, it is anticipated that the female would respond with a wing-flick during the long gap at the end of each phrase.

This species has been observed calling during the day and it is not known whether it also sings at dusk. The calling song maintains an even frequency distribution throughout, with a high amplitude plateau of 12.2–18.5 kHz and a dominant frequency of 14.2–14.7 kHz.

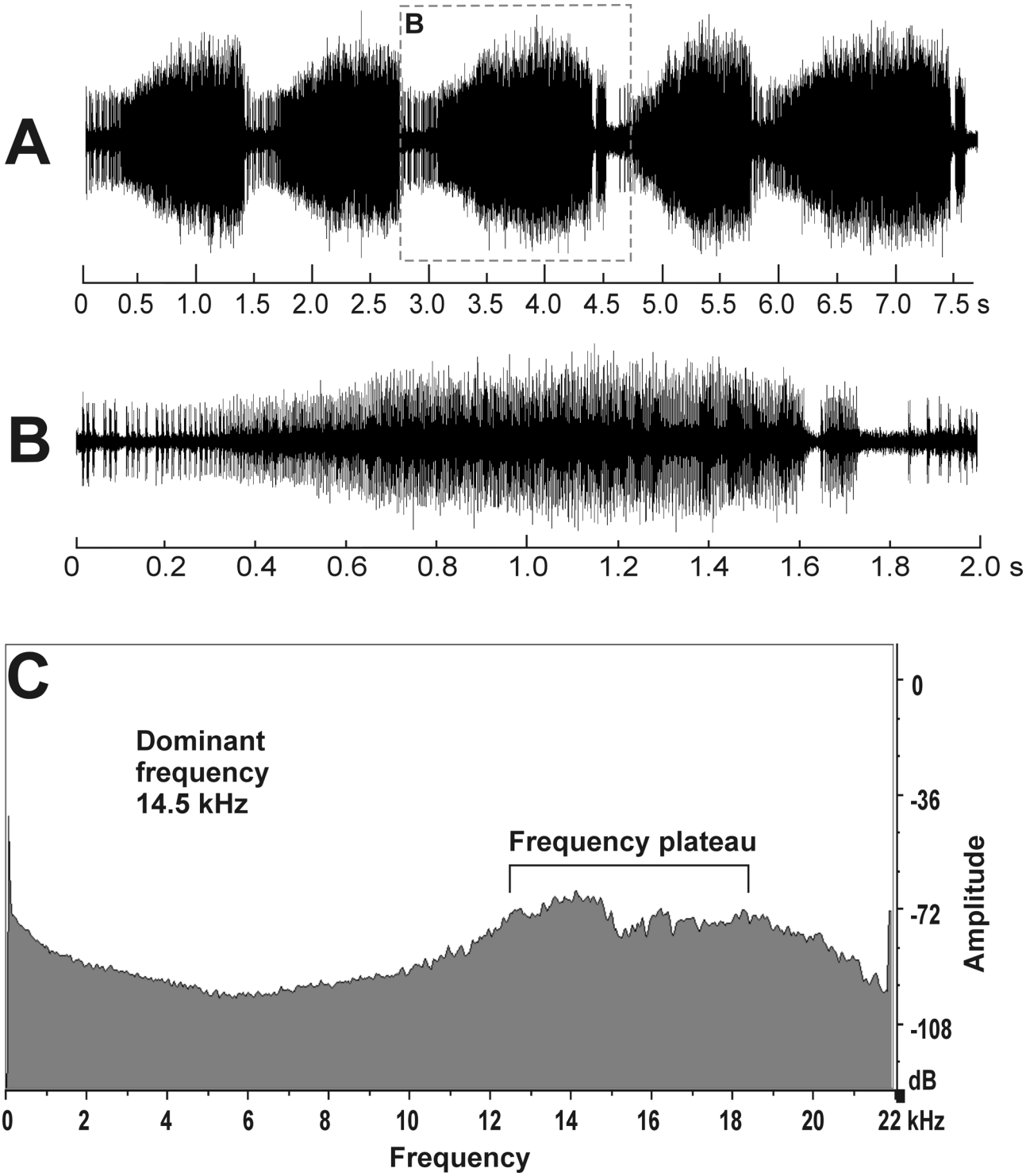

FIGURE 29. Male calling song structure of *Myopsalta riverina* **n. sp.** from a recording obtained at 33 km SSW. of Rankins Springs (33°55'S 145°56'E) by the author using RS5 (see Methods). (A) Wave plot of two complete phrases, each containing three and two echemes, respectively, followed by a long macrosyllable. (B) Expanded wave plot showing the detailed structure of the concluding echeme and long macrosyllable at the end of a phrase; this is followed by a short excerpt from beginning of the next phrase. (C) Spectrogram showing the highest amplitude frequency plateau and dominant frequency.

***Myopsalta septa* n. sp.**
(Figs 1N, 21F, 22K, 22L, 28, 30, 31; Plate 14)

Types. **Holotype**: ♂ Tannymorel, SEQ, 21.x.2001, L. Popple, J. Moss, 288-0002, QM Reg. No. T239571 (**QM**); **Paratypes**: QUEENSLAND: 1♀ Westbrook Creek, 7 km W. of Drayton, 3.xii.2001, J. Moss & L. Popple, 288-0008 (**QM**); 1♂ same data as previous, 288-0009; 3♂ same data as holotype, 288-0001, 288-0003, 288-0004; 1♂ Willowvale N. of Warwick, 11.xii.2001, L. Popple & J. Moss, 288-0005; 2♂ Leslie Dam via Warwick, 20.xi.2001, L. Popple & J. Moss, 288-0006, 288-0007; 2♂ Drayton, 2.xii.2001, L. Popple & J. Moss, 288-0010, 288-0011; 1♂ Junction of New England and Cunningham Highways, 11.xi.2001, L. Popple & J. Moss, 288-0012; 2♂ 10 km N. of Toowoomba, 28.x.2001, L. Popple & J. Moss, 288-0013, 188-0014; 1♂ 2 km N. of Oakey, 19.x.2003, L. Popple & A. Strange, 288-0015; 1♀ Gore, near Cement Mills, Cunningham Highway via Warwick, 10.xii.2003, L.W. Popple, 188-0016 (**LWP**); 1♂ Warwick, 1.i.1990, R. Eastwood (**MSM**); NEW SOUTH WALES: 3♂ 1♀ Delungra, 29°33.20'S 150°49.45'E, 10.xii.2011, N. & D. Emery (**DE**); 1♂ same data as previous, 288-0017 (**LWP**).

Etymology. The Latin word *septa* (plural, a noun in apposition), meaning paddocks, enclosures, referring to the largely modified habitat that this species occupies (virtually all specimens have been taken from paddocks in agricultural areas).

Description. Male. (Figs 1N, 21F, 22K, 22L; Plates 14A, 14B).

Head: Postclypeus predominantly black, pale brown to orange-brown along lateral and ventral margins and with a pale brown area medially in anterior view, extending on to dorsal side and widening posteriorly; supra-antennal plates black, pale brown anteriorly and dorso-laterally; genae black; mandibular plates black, covered by silvery pubescence; frons black; vertex black, with a pale brown area extending along epicranial suture from between lateral ocelli to posterior margin; vertex and frons with sparse silvery pubescence; ocelli pale red; compound eyes brown; anteclypeus black, brown to pale brown medially; rostrum brown to dark brown, darker apically, extending to posterior margins of mid coxae; antennae dark brown to black.

Thorax: Pronotum brown; central fascia yellow-brown, surrounded with black colouration, which broadens towards anterior and posterior pronotal margins; interior pronotum with irregular dark brown to black patches near paramedian and lateral fissures; lateral margins black; pronotal collar black, with brown to dark brown dorso-lateral posterior margins; metanotum dark brown to black; mesonotum brown; submedian sigilla black; lateral sigilla broad, dark brown to black; lateral edges of mesonotum black; cruciform elevation and wing grooves brown, black medially; posterior quarter of mesonotum with dense fine and sparse long silver pubescence.

Wings: Fore wings hyaline; basal membranes pale orange-brown; pterostigmata brown; veins, including costal vein, pale brown to brown, darker distally. Hind wing plagas white at base, this colour extending along jugal folds and terminating before apices, pale brown medially; hyaline over remainder; veins pale brown basally, brown to dark brown on distal half.

Legs: Fore coxae pale brown, with extensive longitudinal dark brown areas on medial anterior and posterior sides; mid and hind coxae pale brown, with dark brown longitudinal markings on all sides; meracantha spikes dark brown, becoming pale brown apically and sometimes laterally, overlapping opercula; fore femora dark brown with pale brown longitudinal areas on outer anterior sides, pale brown apically; mid femora dark brown with pale brown apices; hind femora dark brown, sometimes pale brown basally and apically; fore tibiae dark brown; mid tibiae pale brown with a dark brown band on lower apical half; hind tibiae pale brown; fore tarsi brown to dark brown; mid tarsi pale brown basally, grading to brown apically; hind tarsi pale brown; pretarsi and claws brown.

Opercula (Fig. 1N): Broadly rounded; dark brown basally, brown to pale brown over remainder; plates undulating, medial areas weakly depressed.

Timbals (Fig. 21F): Anterior rib 5 abbreviated; rib 4 also abbreviated, with a prominent isolated remnant extension ventrally; ribs 1 and 2 joined ventrally and fused dorsally to basal spur; anterior termination of basal spur fused with ribs 3–4, with rib 5 unattached; prominent intercalary short ribs in medial areas between ribs 1 and 2, 2 and 3, and 3 and 4 (three in total).

Abdomen: Tergites 1 and 2 black; tergite 2 wider along dorsal midline than tergites 3 to 7; tergites 3 to 7 black, with diffuse brown areas on dorso-lateral posterior margins, all with dense short silver pubescence on dorso-lateral sides and with extensive long and short silver pubescence on lateral sides; tergite 8 black, covered in short silver pubescence; intersegmental membranes pale olive-brown to brown; epipleurites black, with sparse silver pubescence; sternite II black laterally, pale brown ventro-laterally, with a dark brown area medially; sternites III to VI pale brown laterally, with dark brown areas medially, which broaden slightly posteriorly, gradually increasing in size distally in each successive sternite; sternite VII dark brown, often with diffuse pale brown to brown areas

along lateral margins, sometimes also pale brown over posterior third; sternite VIII pale brown, or entirely dark brown to black in some specimens; anterior sternites visible in lateral view.

Genitalia (Figs 22K, L): Pygofer dark brown, becoming brown to pale brown posteriorly; upper lobes in ventral view relatively linear, with terminals directed inwards and dorsally, broadly tapering; basal lobes in ventral and lateral views relatively flat; median lobe of uncus rounded, protruding gradually; claspers in ventral view conspicuous, diverged or closely abutting, with acute apices; pseudoparameres projecting further (ventrally) than endotheca and ventral support; ventral support acute, projecting slightly beyond endotheca; endotheca fleshy.

Female (Plate 14C): Head, wings and legs match description of male.

Thorax: Pronotum brown; central fascia pale brown, surrounded with black colouration, which broadens towards anterior pronotal margin and to a lesser degree towards posterior pronotal margin; pronotal collar mostly brown to pale brown, tending dark brown to black anteriorly and on margins of lateral angles; metanotum dark brown to black; mesonotum brown to pale brown; submedian sigilla black; lateral sigilla black with sporadic brown intrusions; cruciform elevation and wing grooves pale brown, dark brown medially; posterior quarter of mesonotum with dense fine and sparse long silver pubescence.

Abdomen: Tergite 1 dark brown, pale brown on dorso-lateral sides; tergites 2 to 7 dark brown, with brown areas on dorso-lateral posterior quarters; tergite 8 brown, dark brown on anterior third and medially; tergites 7 and 8 with conspicuous long silver pubescence; auditory capsules black; abdominal segment 9 brown, with dark brown to black dorso-lateral markings, tending pale brown on posterior lateral sides; dorsal beak black, sharply defined; sternite II pale brown, brown to dark brown medially; epipleurites pale brown with dark brown speckling; sternites III to VI pale brown with relatively narrow dark brown areas medially, often broadening posteriorly; sternite VII pale brown; ovipositor sheath extends approximately 3.5 mm beyond apex of abdominal segment 9.

Measurements. N=15♂ 3♀. Ranges and means (in parentheses), mm; BL: ♂ 12.9–16.0 (14.27); ♀ 16.0–18.8 (17.55). FWL: ♂ 15.0–17.0 (16.09); ♀ 15.6–18.5 (17.35). HW: ♂ 4.0–4.4 (4.13); ♀ 4.3–4.4 (4.35). PW: ♂ 4.0–4.6 (4.22); ♀ 4.5–4.7 (4.57). AW: ♂ 4.3–4.9 (4.61); ♀ 4.1–4.6 (4.48). FWL/W: ♂ 2.65–2.96 (2.76); ♀ 2.70–2.95 (2.80). OL: ♀ 7.8–9.0 (8.55).

Morphological distinguishing features. *Myopsalta septa* **n. sp.** can be distinguished from *M. atrata*, *M. binotata*, *M. coolahensis*, *M. gordoni* **n. sp.**, *M. lactea*, *M. libritor*, *M. waterhousei* and *M. xerograsidia* **n. sp.** by the colour of the basal membranes of the fore wings, which is pale brown or pale orange rather than white to pale grey. It can be separated from the closely similar *M. melanobasis* **n. sp.** and *M. platyptera* **n. sp.** following examination of the fore wing basal cells, which are entirely hyaline rather than partially opaque. Males and females can be separated from *M. albiventris* **n. sp.** and *M. wollomombii* by the colouration of the sternites, which is predominantly brown to dark brown centrally (cf. almost entirely pale brown). They can be distinguished from *M. chrysopedia* **n. sp.**, *M. majurae* **n. sp.** and *M. riverina* **n. sp.** by having a head width <4.6 mm. Males can be distinguished from *M. bassiana* **n. sp.**, *M. mackinlayi*, *M. leona* **n. sp.**, *M. longicauda* **n. sp.**, *M. parvula* **n. sp.** and *M. umbra* **n. sp.** by the colouration of sternite VII, which is brown to dark brown bordered with pale brown on the lateral and sometimes ventral margins, rather entirely dark brown to black. In south-east Queensland, *M. septa* **n. sp.** can be distinguished from the closely similar *M. crucifera* by the colour of the dorso-lateral sides of the tergites, which is black rather than brown. In parts of northern Queensland males of a darker form of *M. crucifera* may appear indistinguishable from *M. septa* **n. sp.**; however the latter species does not occur in northern Queensland. Females of *M. septa* **n. sp.** can be distinguished from *M. bassiana* **n. sp.**, *M. crucifera*, *M. leona* **n. sp.**, *M. mackinlayi*, *M. longicauda* **n. sp.**, *M. parvula* **n. sp.** and *M. umbra* **n. sp.** by the length of the ovipositor sheath, which extends approximately 3.5 mm beyond the apex of abdominal segment 9; this length being slightly greater than the length of abdominal segment 9 (each of these other species has a shorter ovipositor length with the exception of *M. longicauda* **n. sp.**). Notably, females of *M. majurae* **n. sp.** and *M. riverina* **n. sp.** are not yet available for comparison.

Distribution, habitat and behaviour (Fig. 28). *Myopsalta septa* has a restricted distribution in central eastern Australia within the area bounded approximately by Jandowae, Murphy's Creek, Killarney in south-east Queensland and Delungra in northern New South Wales. Populations occur in open grassland and grassy paddocks where the adults are typically found on grass or low timber. Adults have been found from October to December. Males sing actively during warm sunny conditions, or more tentatively during cool and/or windy weather.

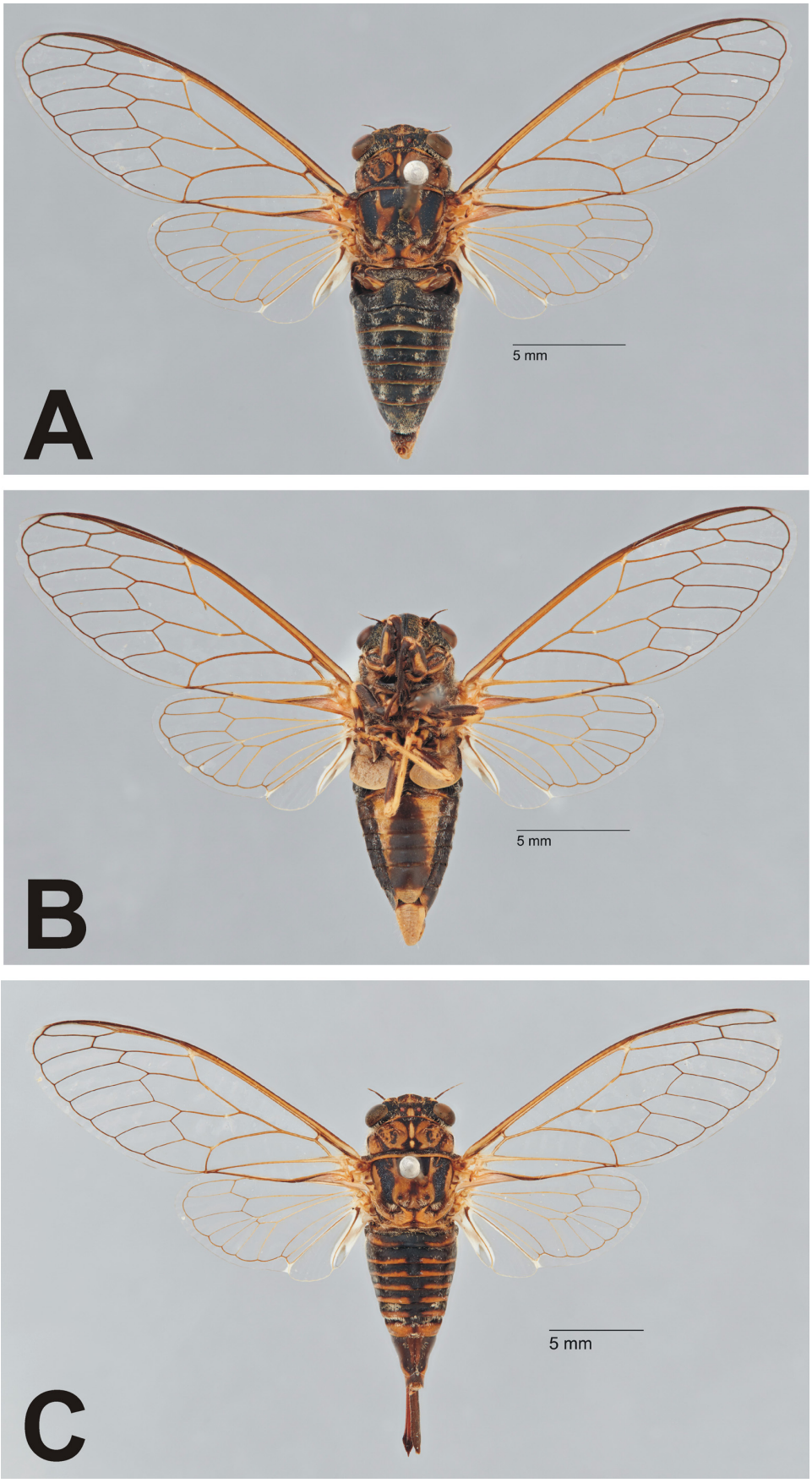

PLATE 14. *Myopsalta septa* **n. sp.**: (A) male holotype, Tannymorel (28°19'S 152°08'E), dorsal view; (B) male holotype, ventral view; (C) female paratype, 7 km W. of Drayton (27°37'S 151°48'E), dorsal view.

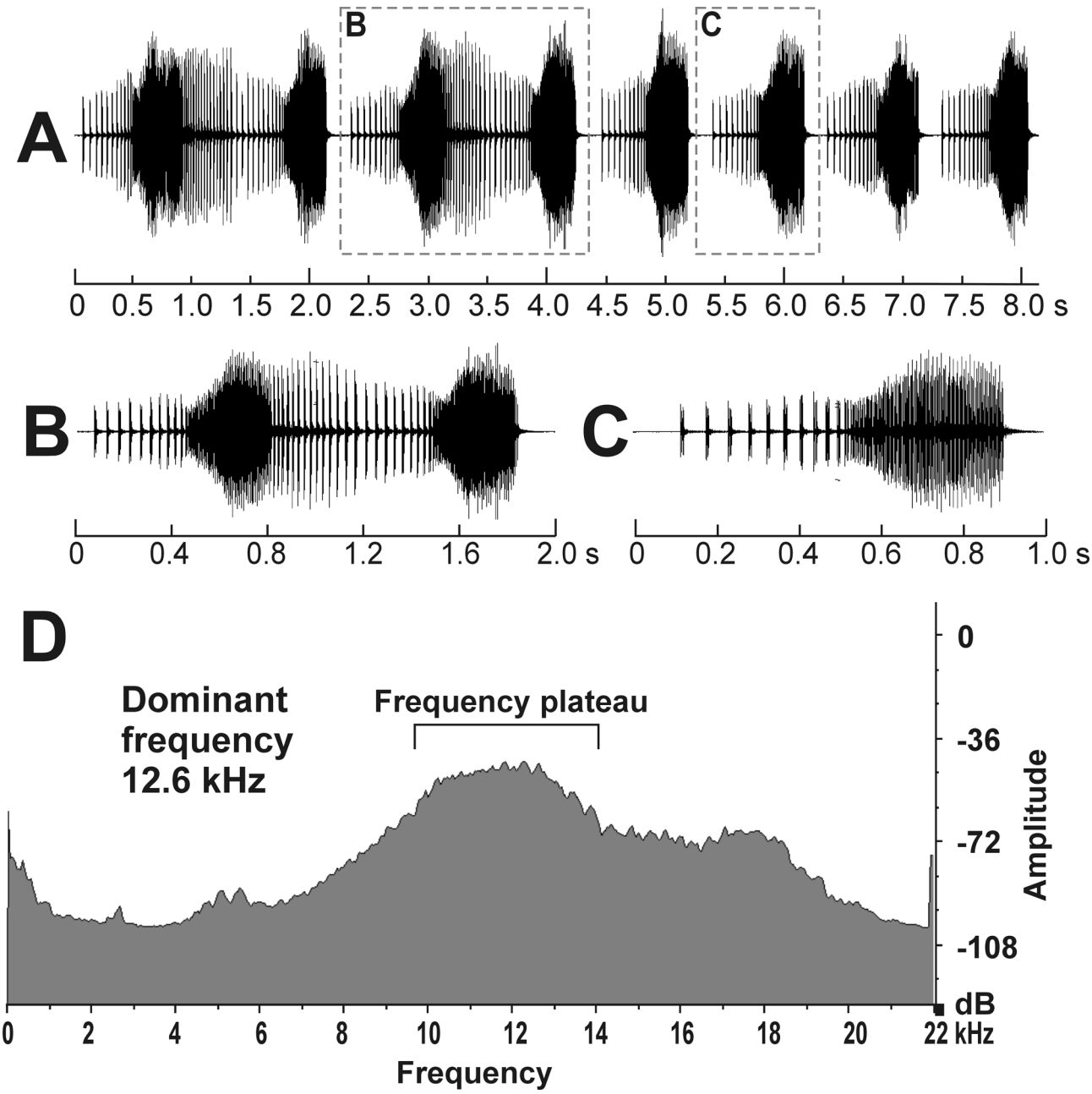

FIGURE 30. Male calling song structure of *Myopsalta septa* **n. sp.** from a recording obtained at Tannymorel (28°19'S 152°08'E) by the author using RS2 (see Methods). (A) Wave plot illustrating the two different subphrase types, including two double-echeme subphrases followed by four single echeme subphrases. (B) Expanded wave plot showing the detailed structure of a double echeme subphrase. (C) Expanded wave plot showing the detailed structure of a single echeme subphrase. (D) Spectrogram showing the highest amplitude frequency plateau and dominant frequency.

Calling song (Figs 30, 31). The calling song of *M. septa* has a reeling or sweeping quality. This is due to the presence of slightly varying arrangements of syllable sequences, echemes and silent gaps. Close examination of song structure reveals that there are two subphrase types: a single echeme subphrase and a double echeme subphrase. These appear to interchange freely (and often unpredictably) during song production. The single echeme subphrases each comprise a sequence of 4–>10 syllables (syllables 0.01 s duration, gaps <0.01–0.08 s duration, decreasing successively; total duration of 0.09–0.43 s), followed by a long echeme (0.24–0.39 s) and a long gap (0.15–0.53 s duration) (all statistics, *n*= 19 recordings). Within each single echeme subphrase, the amplitude increased markedly during production of the echeme to a multiple of up to 3x the amplitude of the preceding syllable sequence. The double echeme subphrase commences in the same way as the single echeme subphrase except that following the long echeme there is a second, longer and higher amplitude, syllable sequence

(with gaps between syllables initially 0.005–0.015 s duration, extending up to 0.03–0.07 s duration in mid sequence, then decreasing again towards the end of the sequence; 0.6–1.1 s total duration), followed by another echeme (0.25–0.43 s duration) and a long gap (typically 0.14–0.24 s duration). It is suspected that females would respond with a wing-flick signal to a calling male during the long gaps; however it is not known whether they respond at the end of each single echeme subphrase or each double echeme subphrase, or both.

This species calls during the day in warm, sunny conditions. The calling song maintains an even frequency distribution throughout, with a high amplitude plateau betwen 9.8 and 14.7 kHz and a dominant frequency of 10.5–13.0 kHz.

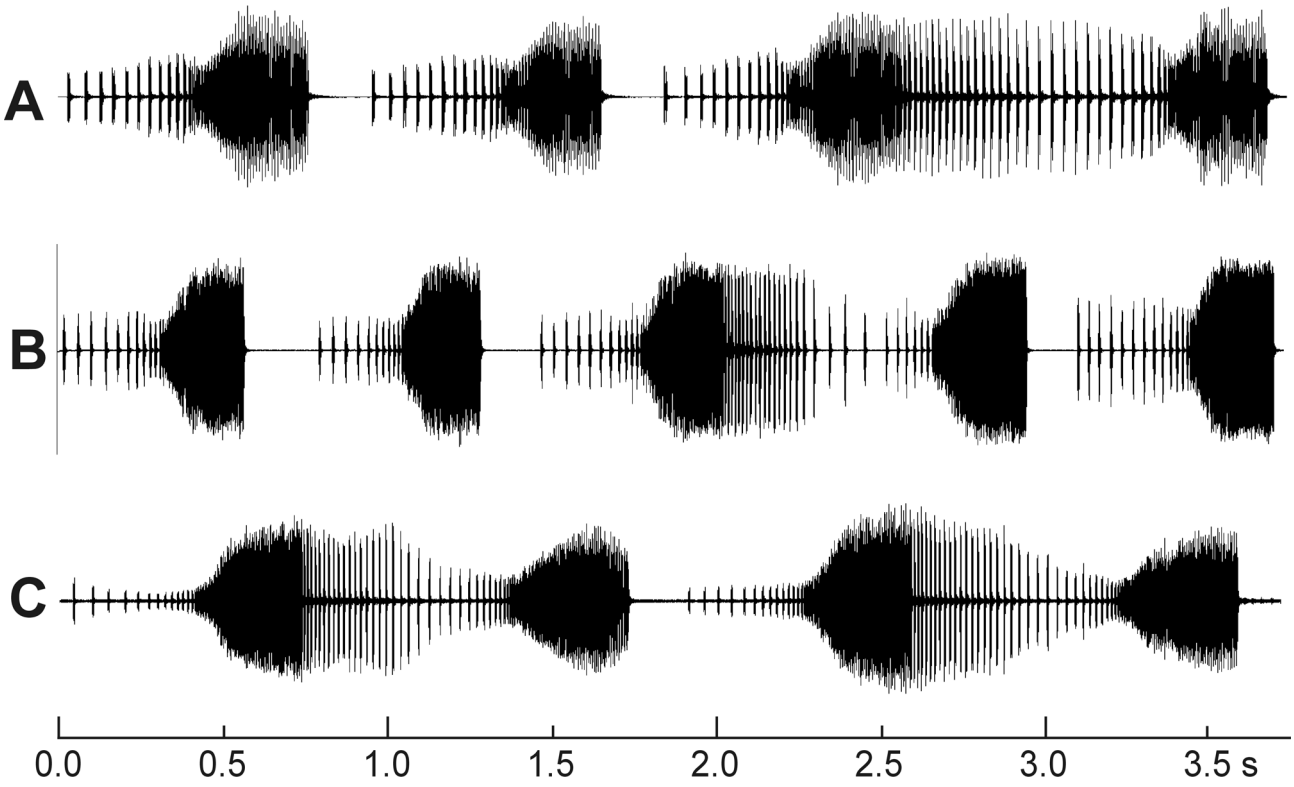

FIGURE 31. Wave plots illustrating the calling song of *Myopsalta septa* **n. sp.** from three different locations, including (A) Tannymorel (28°19'S 152°08'E), (B) Leslie Dam (28°13'S 151°55'E), and (C) Glenvale (27°35'S 151°53'E). Recordings were obtained by the author using RS2 (A) and RS6 (C), and A. Ewart using RS3 (B) (see Methods).

***Myopsalta umbra* n. sp.**
(Figs 1O, 21G, 22M, 22N, 28, 32, 33; Plate 15)

Types. **Holotype**: ♂ SEQ: Binjour Plateau, Swains Rd, 25°32'S 152°30'E, 21.xii.1997, 340m, C.J. Burwell, S. Evans, softwood scrub, QM Reg. No. T239572 **(QM)**; **Paratypes**: QUEENSLAND: 1♂ 3♀ same data as holotype; 2♀ Hurdle Gully, 13.3 km WSW Mon to, 24°55'S 150°59'E, 390 m, 20.xii.1997, mv lamp, Burwell, Evans, Ewart; 1♀ SEQ: 25°42'S 151°26'E, Nipping Gully, Site 6, 18–19.xii.1998, 200 m, G. Monteith, C. Gough & G. Maywald; 1♀ The Bluff (Keysland), 26°15'S 151°43'S, 530 m, 24.xi.1995–3.ii.1996, G. Monteith, flight intercept, vine scrub; 3♀ Fairlie's Knob, 0.5 km S., 25°31'S 152°17'E, 300 m, 20.xii.2000–23.iii.2001, Cook & Monteith, hoop pine scrub, 9975 (**QM**); 1♂ The Amphitheatre, NW. Robinson National Park, 25°12.67'S 148°59.25'E, 19.xii.1997, vine scrub; 2♂ Hurdle Gully, W. of Mon to, near 24°54.43'S 151°00.26'E, half way down gully road, 20.xii.1997, vine scrub (**AE)**; 1♂ Kalbar (Hancock Road), 18.i.2001, L. Popple, J. Moss, 280-0001 (**LWP**).

Etymology. The Latin *umbra* (singular, a noun in apposition) means 'shadow' or 'shade'. This refers to the heavily shaded habitat with which this cicada is associated.

Description. Male. (Figs 1O, 21G, 22M, 22N; Plates 15A, 15B).

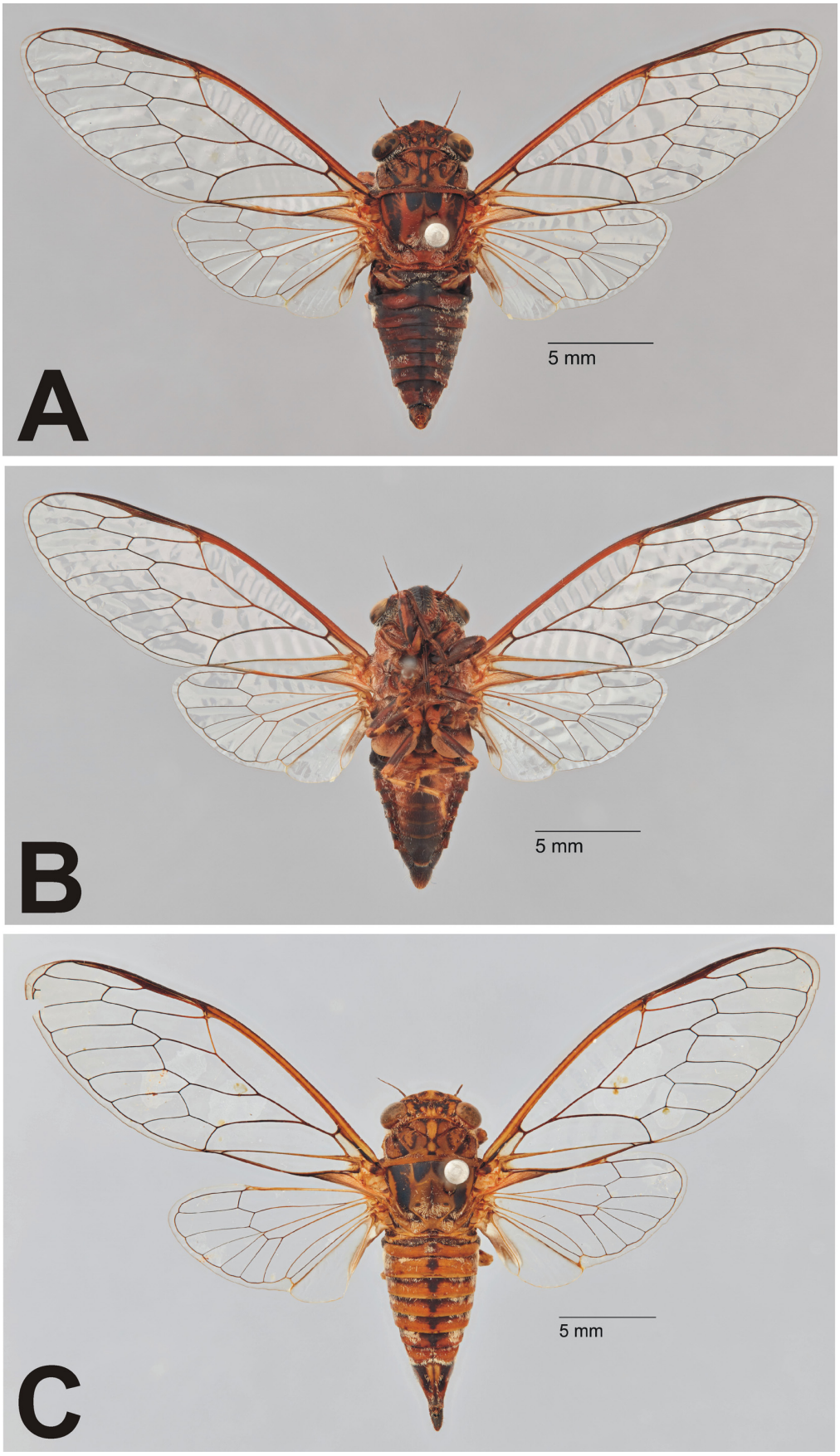

PLATE 15. *Myopsalta umbra* **n. sp.**: (A) male holotype, Binjour Plateau (25°32'S 152°30'E), dorsal view; (B) male holotype, ventral view; (C) female paratype, Hurdle Gully (24°55'S 150°59'E), dorsal view.

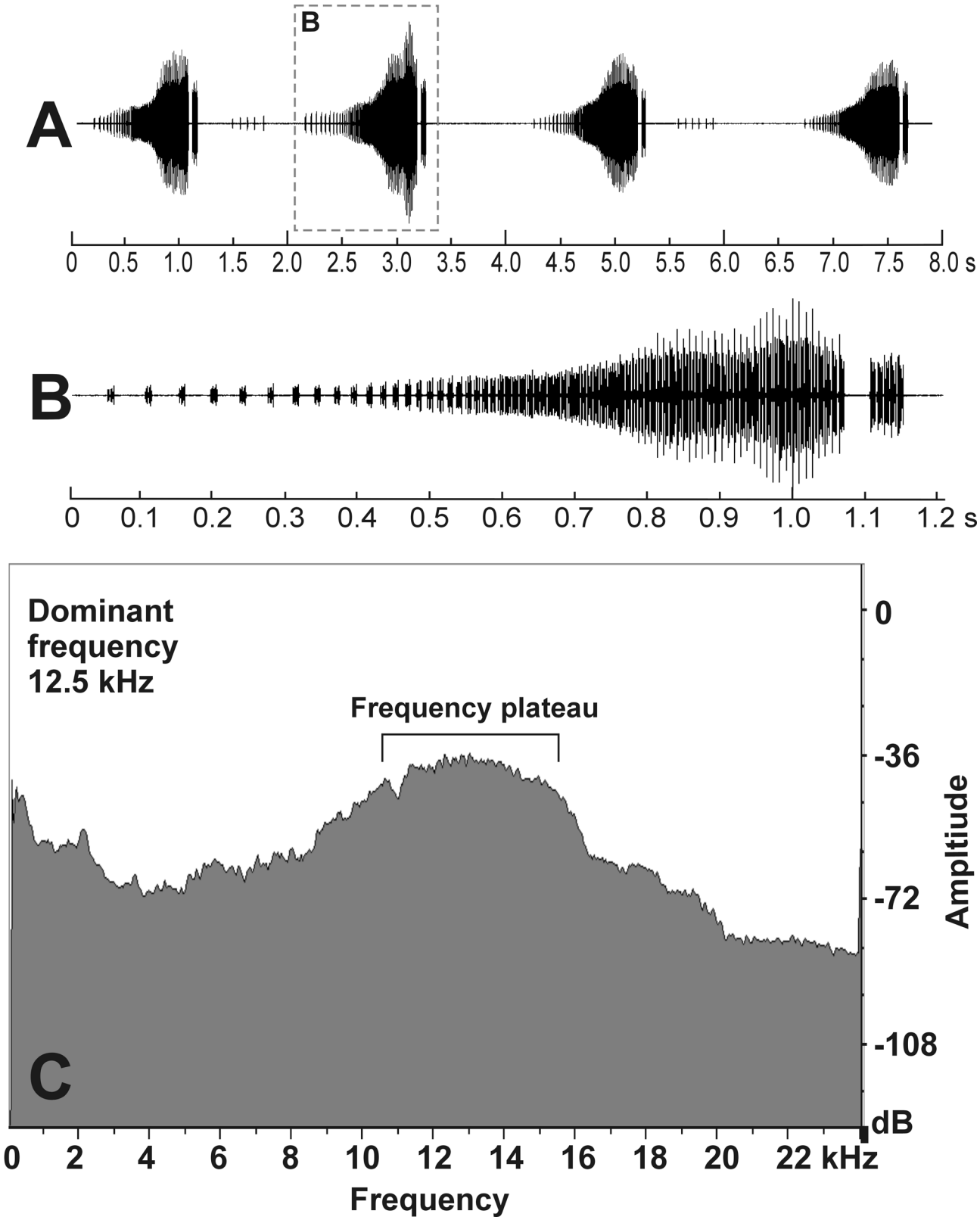

FIGURE 32. Male calling song structure of *Myopsalta umbra* **n. sp.** from a recording obtained at Yarraman (26°49'S 151°57'E) by the author using RS1 (see Methods). (A) Wave plot illustrating four phrases, each containing a sequence of discrete syllables that builds in amplitude and condenses into a long echeme, which then ends abruptly and is followed by a short echeme or macrosyllable. (B) Expanded wave plot showing the structure of a single phrase, including the amplitude modulation of the long echeme and the short echeme that follows. (C) Spectrogram showing the highest amplitude frequency plateau and dominant frequency.

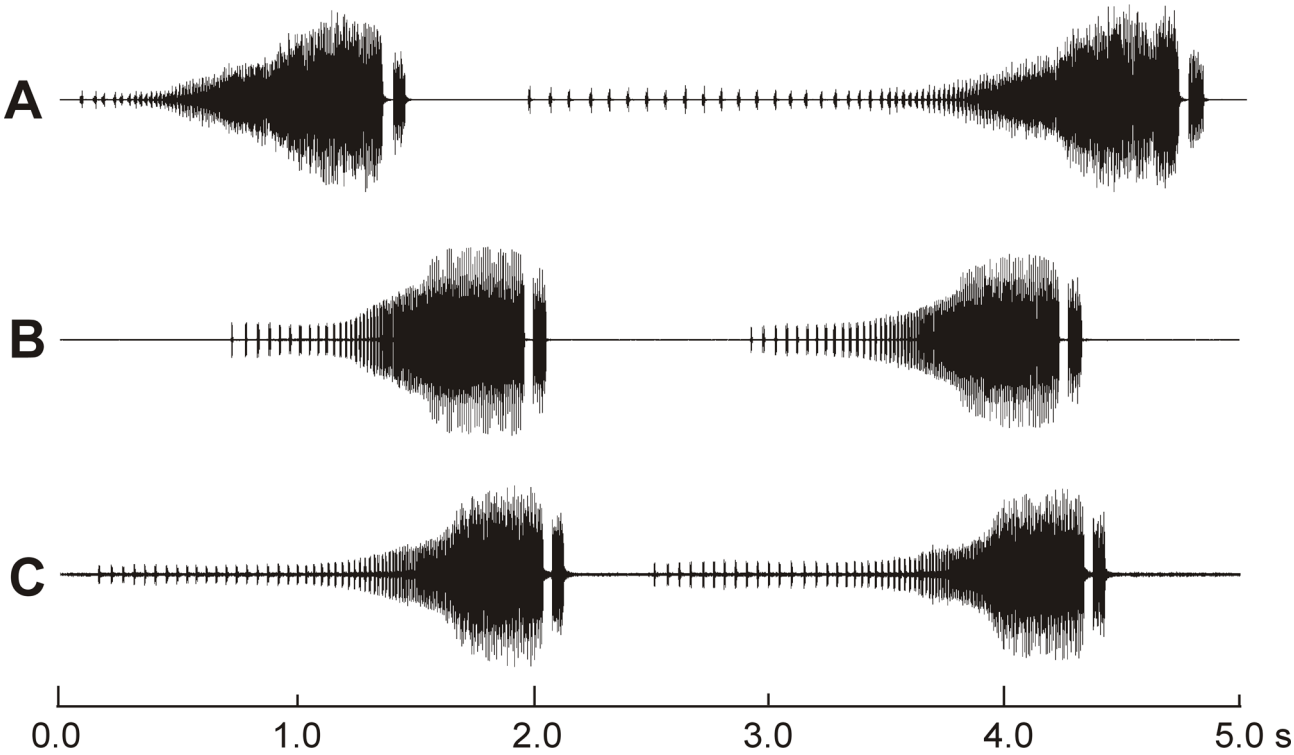

FIGURE 33. Wave plots illustrating the calling song of *M. umbra* **n. sp.** from four different locations, including (A) Hurdle Gully (24°54'S 151°00'E), (B) Yarraman (26°49'S 151°57'E), and (C) Mt French (28°00'S 152°37'E). Recordings were obtained by A. Ewart using RS3 (A) and the author using RS1 (B, C) (see Methods).

Head: Postclypeus predominantly reddish brown, dark brown to black anterio-laterally and ventro-medially; supra-antennal plates and genae brown to reddish-brown, darker adjacent to postclypeus; mandibular plates brown, brown along lateral margins, with silver pubescence; vertex and frons brown to reddish brown, with dark brown areas surrounding ocelli and along margins adjacent to postclypeus, sometimes also extending to lateral margins adjacent to compound eyes; ocelli pink; compound eyes brown; anteclypeus brown to orange-brown; rostrum brown, dark brown apically, clearly extending beyond posterior margins of mid coxae; antennae brown to dark brown.

Thorax: Pronotum predominantly brown to olive brown, with irregular black patches near paramedian and lateral fissures; central fascia brown, surrounded with black colouration, which broadens along anterior and posterior pronotal margins; pronotal collar mostly reddish brown, dark brown on anterio-lateral margins; metanotum dark brown to black; mesonotum brown to reddish-brown; submedian sigilla black; lateral sigilla black with diffuse dark reddish-brown areas; cruciform elevation and posterior half of wing grooves orange-brown; posterior third of mesonotum with dense fine and sparse long silver pubescence.

Wings: Fore wings hyaline; basal membranes orange to pale orange-brown; pterostigmata orange to reddish brown; vein CuP+1A pale brown; other veins, including costal vein, brown to dark brown, darker distally. Hind wing plagas white at base, grading to grey-brown along basal two thirds, this colour extending broadly along jugal folds and terminating before apex, hyaline over remainder; veins pale brown basally, brown medially, dark brown on distal third.

Legs: Coxae brown, becoming darker apically; meracantha spikes dark brown, becoming pale brown apically, overlapping opercula; fore femora dark brown with pale brown longitudinal areas on outer anterior and posterior sides, pale brown at apices; mid femora brown to dark brown with pale brown apices; hind femora dark brown to brown with pale brown apices; fore tibiae dark brown; mid tibiae dark brown, each with a pale brown band above base and another smaller band near apex; hind tibiae pale brown, with a dark brown band centrally; fore and mid tarsi mottled dark brown to pale brown; hind tarsi pale brown; pretarsi brown with dark brown apical areas; claws dark brown.

Opercula (Fig. 1O): Broadly rounded; dark brown basally grading to brown or pale brown at crest; plates undulating, each with a clearly defined ridge, medial areas depressed.

Timbals (Fig. 21G): Anterior rib 5 abbreviated; rib 4 also abbreviated, with a prominent isolated remnant extension ventrally; ribs 1 and 2 joined ventrally and fused dorsally to basal spur; anterior termination of basal spur fused with ribs 3–4, with rib unattached; prominent intercalary short ribs in medial areas between ribs 1 and 2, 2 and 3, and 3 and 4 (three in total).

Abdomen: Tergite 1 black; tergite 2 wider along dorsal midline than tergites 3 to 7; tergites 2 to 8 dark brown to black, typically with broad reddish-brown areas dorso-laterally, diffuse anteriorly and extending to posterior margins, all with dense short silver pubescence on dorso-lateral sides and with extensive long and short silver pubescence on lateral sides; intersegmental membranes brown; epipleurites coloured like adjacent tergites, with sparse silver pubescence; sternite II black laterally, pale brown ventro-laterally, with a dark brown area medially; sternites III to VI pale brown laterally, with dark brown areas medially, which broaden posteriorly, gradually increasing in size distally in each successive sternite; sternite VII dark brown, sometimes with diffuse pale brown areas at extreme anterio-lateral margins; sternite VIII dark brown basally, grading to brown apically; anterior sternites visible in lateral view.

Genitalia (Figs 22M, N): Pygofer reddish brown to dark brown; upper lobes in ventral view relatively linear, with terminals directed dorsally and apically acute; basal lobes in ventral view relatively linear, in lateral view slightly curved in the vertical plane, subtly expressed; median lobe of uncus rounded, protruding gradually; claspers in ventral view conspicuous, abutting or weakly diverging, with sharply developed apices; pseudoparameres projecting further (ventrally) than endotheca and ventral support; ventral support acute, projecting slightly beyond endotheca; endotheca fleshy.

Female (Plate 15C): Head, thorax, wings and legs match description of male.

Abdomen: Tergite 1 black; tergites 2 to 7 brown to reddish- or olive-brown, with dark brown to black areas along anterior margins, each extending posteriorly along centre and narrowing towards posterior margins; tergite 8 brown to orange-brown or olive-brown; auditory capsules dark brown, diffuse; abdominal segment 9 brown to orange-brown dorsally, dark brown laterally and ventrally, with black longitudinal markings on dorso-lateral sides; dorsal beak dark brown, sharply defined; sternite II black laterally and medially, otherwise pale to medium brown; epipleurites dark brown anteriorly, grading to pale brown over posterior half; sternite III pale brown with minor dark brown spot medially; sternites IV to VI pale brown with dark brown to black areas medially, broadening slightly posteriorly, typically similar in width, though often widest on sternite V; sternite VII pale brown; ovipositor sheath extends approximately 1.0 mm beyond termination of abdominal segment 9.

Measurements. N=6♂ 8♀. Ranges and means (in parentheses), mm; BL: ♂ 13.8–15.6 (14.5); ♀ 15.0–18.3 (16.5). FWL: ♂ 15.6–18.0 (16.9); ♀ 16.8–20.1 (18.9). HW: ♂ 4.1–4.7 (4.3); ♀ 4.2–4.7 (4.5). PW: ♂ 3.9–4.4 (4.2); ♀ 4.2–5.1 (4.6). AW: ♂ 4.1–4.7 (4.5); ♀ 4.2–4.9 (4.6). FWL/W: ♂ 2.64–2.89 (2.76); ♀ 2.69–3.00 (2.85). OL: ♀ 4.5–5.6 (5.2).

Morphological distinguishing features. *Myopsalta umbra* **n. sp.** can be distinguished from *M. atrata*, *M. binotata*, *M. coolahensis*, *M. gordoni* **n. sp.**, *M. lactea*, *M. libritor*, *M. waterhousei* and *M. xerograsidia* **n. sp.** by the colour of the basal membranes of the fore wings, which is pale brown or pale orange rather than white to pale grey. It can be separated from the closely similar *M. melanobasis* **n. sp.** and *M. platyptera* **n. sp.** through examination of the fore wing basal cells, which are entirely hyaline rather than partially opaque. Males and females can be separated from *M. albiventris* **n. sp.** and *M. wollomombii* by the colouration of the sternites, which is predominantly dark brown (cf. almost entirely pale brown). They can be differentiated from *M. bassiana* **n. sp.**, *M. chrysopedia* **n. sp.**, *M. crucifera*, *M. mackinlayi* **n. sp.**, *M. leona* **n. sp.**, *M. longicauda* **n. sp.** *M. majura* **n. sp.**, *M. parvula* **n. sp.**, *M. riverina* **n. sp.** and *M. septa* **n. sp.** by the colour of the costa and dorso-lateral sides of the tergites, which in each of these structures is predominantly reddish-brown, rather than brown or black.

Distribution, habitat and behaviour (Fig. 28). *Myopsalta umbra* is restricted to south-east Queensland from Expedition Range, Isla Gorge and near Monto (Hurdle Gully) east to Lake Lenthall near Maryborough and south to Mt French near Boonah. Populations typically inhabit remnant patches of semi-evergreen vine thicket. Adults occur in the middle stratum, typically on woody vegetation. They have been found from October to January, apart from the Cracow specimens, which were collected in mid-February. This is the only species of *Myopsalta* known to occupy the interior of a dry rainforest habitat, specifically in a microhabitat that is almost continuously shielded from direct sunlight. Another species, *M. mackinlayi*, may be found on the margins of this habitat, and in disturbed or ecotonal areas (e.g. vine thicket with eucalypt canopy), but generally not in the vine thicket interior.

Calling song (Figs 32, 33). The song contains a set of repeated phrases. At the onset of calling, each phrase

begins with a long echeme (0.509–1.199 s duration), followed by a 0.035–0.046 s gap, a short echeme or macrosyllable (0.034–0.060 s duration) and a 0.376–2.701 s gap (all statistics, *n*=9 recordings). Close inspection of the beginning of the long echemes in each phrase reveals a series of discrete syllables that coalesce and increase of at least 4x in amplitude during production of the echeme. After production of several successive echemes, males typically start to lengthen the introduction of each phrase with the addition of a long sequence of syllables (each 0.007–0.011 s duration), separated by gaps of 0.030–0.080 s duration. These introductory sequences range in duration between 1.12 and 1.59 s, with the longest examples typically coinciding with particularly short gaps at the end of the preceding phrase. Field observations indicate that the female responds during the gap following the short echeme or macrosyllable at the end of each phrase.

This species calls during the day and it is not known whether it also calls at dusk. The calling song maintains an even pitch throughout, with a highest amplitude frequency plateau of 10.3–16.0 kHz and a dominant frequency between 12.2 and 15.1 kHz. It is near identical to the call of *M. bassiana*, but differs in the greater degree of amplitude modulation in the production of each long echeme.

Myopsalta xerograsidia **n. sp.**

(Figs 1P, 21H, 22O, 22P, 28, 34, 35; Plate 16)

Cicadetta sp. nr *crucifera*: Ewart, 1998b: 135–137, Fig. 1, Fig. 2.
Cicadetta sp. nr *crucifera* Fishing Reel Buzzer; 291: Popple & Strange, 2002: 21, 22, 26, 29, Fig. 3C, Fig. 7A, Table 1.
Cicadetta sp. H Fishing Reel Buzzer; 291: Ewart, 2009: 140–142, 150, 168, Fig. 1, Fig. 16, Plate 1.
Myopsalta sp. nr *crucifera* (Ewart, 1998b): Sanborn, 2014: 584.
Myopsalta sp. nr *crucifera* Fishing Reel Buzzer (Popple & Strange, 2002): Sanborn, 2014: 584.
Undesc. Genus, sp. 'pale grass cicada': Marshall and Hill, 2009: 4, 5, 7, 8, Table 2, Figure 6.

Types. **Holotype**: ♂ 4.3 km W. of Cloncurry River, 20°43.11'S 140°27.11'E, 4.ii.1999, A. Ewart, QM Reg. No. T239573 **(QM); Paratypes**: QUEENSLAND: 1♂ Charters Towers, N.Q., 18.iii.1932, A. Marshall, K65439 (**AM**); 1♂ 1♀ Yellow Gin Creek, 18 km SE. of Home Hill, 19.49°S 147.29°E, 24–25.iv.1981, A. Calder; 1♂ Isaac River, 62 miles NNE. of Clermont, 27.iii.1962, Chinnick & Corby; 1♂ Bowen, 13.iii.1958, T. Campbell (**ANIC**); 1♂ Sybella Creek, 20°53'S 139°27'E, 400 m, 2.iii.2002, C.J. Burwell, sweeping; 1♀ 10.1 km E. of Cloncurry, 20°43.33'S 140°37.47'E, 23.i.2000, A. Ewart, shrubland/grassland; 1♂ Laura River xing, S. of Laura, 15.577°S 144.456°E, 37357, 85 m, 12.iii.2017, L. W. Popple, hand netting, open woodld, QM reg. no. T236514; 1♀ Bonnyglen Station, from Spring Ck to Mulligan Hwy, 15.929°S 144.693°E to 16.014°S 144.810°E, 37457, 13.iii.2017, E. Leijs, truck trap, QM Reg. No. T236573 (**QM**); 4♂ 2♀ Musselbrook area, border waterhole, 18°36.73'S 137°59.43'E, 19.iv.1995, exotic grasses; 1♀ N. Stockyard Ck, Musselbrook, 18°26'43"S 137°14'12"E, 18.ix.1995, exotic grasses; 1♂ 1 km from Plantation Creek, Ayr, 19°32.11'S 147°30.06'E, 9.ii.1998; 1♂ same data as previous, 11.ii.1998; 2♂ same data as previous, 9.ii.1999; 1♂ Plantation Creek, near boat landing, Ayr, 19°32.11'S 147°30.04'E, 2.ii.2006, A. Ewart, grassland; 1♀ Ayr, 2.i.1981, sand pit; 1♀ Groper Creek settlement, Home Hill, 11.ii.1998; 1♂ 1♀ Flagstaff Hill , Bowen, 12.ii.1998, grass, recorded; 1♂ Flagstaff Hill, Bowen, 20°00.88'S 148°15.96'E, 26.ii.2000, A. Ewart, grass; 2♂ same data as previous, 22.ii.2003; 2♂ same data as holotype; 1♂ 11 km E. of Cloncurry, 20°43.41'S 140°37.47'E, 4.ii.1999, A. Ewart; 2♂ 2.2 km W. of Lynd/ Mount Surprise road junction via Georgetown, 18°08.59'S 144°47.57'E, 31.i.2002, A. Ewart, grass; 2♂ Plantation Creek, ~1 km from boat landing, Ayr, 19°32.12'S 147°30.01'E, 23.ii.2000, A. Ewart, grassland; 3♂ Macrossan Bridge, 22 km NE. of Charters Towers, 20°00.35'S 146°26.33'E, 28.i.2000, A. Ewart, grass; 2♂ Noonbah homestead exit road, 24°06.32'S 143°11.12'E, 7.ii.2009, A. Ewart; 1♀ Noonbah homestead, 24°06.44'S 143°11.14'E, 8.ii.2009, A. Emmott & A. Ewart, gidyea; 6♂ 10.1 km E. of Cloncurry, 20°43.33'S 140°37.47'E, 23.i.2000, A. Ewart, shrubland/ grassland; 2♂ Rotary Park S. of Ayr, 19°53.20'S 147°24.06'E, 25.ii.2000, A. Ewart; 1♂ 1 km SW. of Alva Beach near Ayr, 19°27.72'S 147°28.58'E, 25.ii.2000, A. Ewart; 1♂ 1♀ 4.2 km W. Normanton/Cloncurry rds, Cloncurry, 20°43.06'S 140°27.10'E, 24.i.2000, A. Ewart; 1♂ Paradise Park, 15 km SSE. of Charters Towers, 20°11.75'S 146°17.99'E, 6.ii.1999, A. Ewart, grass; 1♂ Blackall, iii.1979; 2♂ 3♀ Blackall, ii.1979, after rains, buffel grass; 3♂ 1♀ Peak Downs Highway, Nebo, 10.iii.1984; 1♂ Plantation Creek, Ayr, 19°32.12'S 147°30.01'E, A. Ewart, I Rattray; 1♂ 9.3 km NW. of Blackall, 24°23.29'S 145°23.59'E; 19.i.2000, A. Ewart; 1♂ Lynd Highway, 1 km N. of Hann Creek, 22 km N. of Charters Towers, 19°53.42'S 146°12.50'E, 28.i.2000, A. Ewart; 1♂ 54.6 km W. of

Clermont/ Hughenden [Gregory/ Flinders Highway] road junction, SW. side of Charters Towers, 20°17.55'S 145°46.16'E. 4.ii.2006, A. Ewart, grassland; 4♂ Macrossan Park, Burdekin River, ~25 km NE. of Charters Towers, 20°00.18'S 146°26.35'E, 3.ii.2002, A. Ewart, grass; 1♂ 56.5 km NW. of Hann Creek near Charters Towers, 19°39.99'S 145°46.48'E, 23.ii.2003, A. Ewart, grass; 1♀ 6.7 km WNW. of Greenvale, 18°59.75'S 144°55.34'E, 24.ii.2003, A. Ewart; 1♂ 44 km S. of Dajarra, 20°04.29'S 139°36.67'E, 20.i.2002, A. Ewart, grass along creek; 1♂ 20 km N. of Cloncurry (Normanton Road), Tommy Creek, 20°32.61'S 140°24.97'E, 25.i.2002, A. Ewart, woodland; 1♂ 18 km E. of Mount Isa, 20°42.34'S 139°39.58'E. 24.i.2002, A. Ewart, grass, open woodland; 1♂ 23 km W. of Longreach, 23°14.54'S 144°06.39'E, 17.i.2002, A. Ewart, grass; 2♂ Flagstaff Hill summit area, Bowen, 20°00.93'S 148°15.97'E, 9.ii.2006, A. Ewart; 1♂ Torrens Creek township, 20°46.20'S 145°01.12'E, 4.ii.2006; A. Ewart, grassland; 1♂ 1♀ 5.5 km S. of Mount Surprise/ Lynd road junction, 18°11.46'S 144°48.12'E, 25.ii.2003, A. Ewart; 1♂ 47.1 km E. of Mount Surprise, 18°09.05'S 144°43.87'E, 19.i.2005, A. Ewart, grass; 1♂ 28.5 km E. of Mount Surprise, 18°06.94'S 144°33.73'E, 28.ii.2003, A. Ewart, grass; 1♂ 24.8 km E. of Mount Surprise, 18°21.10'S 144°45.81'E, 19.i.2005, A. Ewart, grass; 1♀ Greenvale Caravan Park, 19°00.06'S 144°59.01'E, 23.ii.2003, A. Ewart; 1♂ 39.5 km WNW. of Greenvale, (11.9 km SE. of Lynd Junction), 18°56.73'S 144°38.68'E, [no date], grass; 3♂ 1♀ 24.8 km south of Mount Surprise/ Lynd road junction, 18°21.10'S 144°45.81'E, 19.i.2005, A. Ewart; 1♂ 0.5 km W. of Wyseby/ Rewan road junction, 24°58.25'S 148°31.42'E, 16.i.2005, A. Ewart, grass; 1♂ Moranbah, 21°59'S 148°01'E, ii.2014, C. Date (**AE**); 1♂ AU.QL.COE, 25 km E. of Camooweal, 19°56.628'S 138°21.320'E, 267 m, 29.i.2006, Hill, Marshall, Moulds; 1♀ AU.QL.BCS, ~51 km S. of Belyando Crossing, 262 m, 21°55.557'S 147°2.776'E, 27.ii.2009, K. Hill, D. Marshall; 1♂ AU.QL.MOG, 28 km E. of Moonie, 27°33.165'S 150°35.846'E, 338 m, 2.i.2009, Hill, Marshall, Moulds, Owen; 1♂ Selwyn Mine, 160 km SE. of Mt Isa, 16.iii.1993, J. Vanbruggen, T. Woodger; 1♂ same data as previous, 19.ii.1993; 1♂ AU.QL.EMX, Anakie, 44 km W. of Emerald, 23°32.846'S 147°43.882'E, 28.i.2009, 253 m, K. Hill & D. Marshall; 1♀ 18°09'S 144°37'E, 5 km SW. Hwy 1 & Undara Rd on Undara Rd, 730 m, 28.i.2011, D.CF. Rentz, B. Richardson, Stop 4; 72♂ 18♀ Torrens Creek Township, 90 km E. of Hughenden, 3.ii.1981, M.S. & B.J. Moulds; 1♂ Mt Garnet, 26.ii.1993, S. Lamond; 13♂ 6♀ nr Forty Mile Scrub at Mt Surprise Road Jtn, 17.i.1986, M.S. & B.J. Moulds; 9♂ 35km E. of Mt Surprise, 17.i.1986, M.S. & B.J. Moulds; 1♂ 1♀ 60 km E. of Hughenden, 4.ii.1981, M.S. & B.J. Moulds; 17♂ 4♀ Bee Ck, 25 km S.W. of Nebo, 6.ii.1981, M.S. & B.J. Moulds; 30♂ 18♀ 60 km NE. of Clermont, 7.ii.1981, M.S. & B.J. Moulds; 22♂ 7 ♀ 70 km NE. of Clermont, 2.iii.1982, M.S. & B.J. Moulds; 1♂ 1♀ 20 km N. of Capella, 19.iii.1982, M.S. & B.J. Moulds; 1♂ Disney Stn, near Belyando R. S. of Charters Towers, 21.xii.1983, M.S. & B.J. Moulds; 3♂ St Margaret's Ck, approx. 20 mi S. Townville, 1.ii.1973, A. & M. Walford-Huggins; 1♀ Townsville Qld, 10.ii.1980, S.J. Johnson 1♂ 1♀ Mount Surprise, 10.iii.1993, S. Lamond; 1♂ Waverley Rest Area nr St Lawrence, 26.xii.1993, M.S. & B.J. Moulds; 1♀ 1 km W. of Mourangee Hsd nr Edungalba, on tree trunk, 17.xi.1984, E.E. Adams; 4♀ Richmond, xii.2000, T. Woodger; 4♂ AU.QL.POL, Porcupine Gorge lookout, N. of Hughenden, 20°24.635'S 144°26.166'E, 8.ii.2010, K. Hill & D. Marshall (**MSM**); NORTHERN TERRITORY: 1♂ 22.5 km E. of Alice Springs, Ross Highway, near Jessie Gap Nature Reserve, 23°46.24'S 134°03.66'E, 17.xii.2005, A. Ewart (**QM**); 1♂ ~8 km W. of Alice Springs, Larapinta Drive, 23°41.91'S 133°48.04'E, 16.xii.2005, A. Ewart; 6 km W. Tanami Des. Rd, Stuart Hwy jct., (20 km N. of Alice Springs), 23°33.16'S 133°48.81'E (**AE**); 1♂ AU.NT.STC, 60 km S. of Tennant Creek, 20°10.932'S 134°13.125'E, 388 m, 31.i.2006, Hill, Marshall, Moulds; 1♂ AU.NT.AIR, 9.4 km NNW. of Larrimah, 15°29.585'S 133°11.371'E, 194 m, 2.ii.2006, Hill, Marshall, Moulds; 1♂ AU.NT.ASE,~20 km E. of Alice Springs, 23°45.183'S 134°01.776'E, 28.i.2010, 526 m, Hill, Marshall, Moulds; 1♂ AU.NT.RSB, Ross Hwy, ~60 km E. of Alice Springs, 23°37.831'S 134°17.718'E, 29.i.2010, Hill, Marshall, Moulds; 1♂ Alice Springs, 24.i.1984, M.S. & B.J. Moulds; 1♀ Tilmouth Well, Napperby Creek, 22°48'40"S 132°35'40"E, 31.i.2001, M.S. & B. J. Moulds (**MSM**); WESTERN AUSTRALIA: ; 1♂ 19km NNW. of Kununurra W.A., nr Buttons Gap, 15.37°S 128.41°E, 8.v.1983, D.CF. Rentz, & J. Balderson (**ANIC**); 1♂ AU.WA.GPG, 90 km WNW. of Fitzroy Crossing, 7.ii.2006, 17°57.276'S 124°49.365'S, Hill Marshall, Moulds; 1♀ AU.WA.HCC, Duncan Rd, 12 km S. of Halls Creek, 6.ii.2006, 380 m, 18°15.019'S 127°45.135'E, Hill, Marshall, Moulds; 1♂ AU.WA.GRS, 45 km S. of Gascoyne River, ~146 km NNE. of Meekatharra, 25°35.579'S 119°14.173'E, 18.ii.2009, 545 m, K. Hill & D. Marshall (**MSM**).

Etymology. A feminine, Latinised, compound adjective composed of the Greek words *xeros*, meaning 'dry', and *grasídi*, meaning 'grass', referring to the dry grassland habitat that this species occupies.

Description. Male. (Figs 1P, 21H, 22O, 22P; Plates 16A–C).

Head: Postclypeus predominantly black, brown to dark brown surrounding lateral and ventral margins, with a

brown to dark brown spot medially, sometimes extending on to median dorsal area; supra-antennal plates black, brown to dark brown on margins; genae black; mandibular plates black, diffuse dull brown to dark brown centrally, with silver pubescence; vertex and frons variably pale brown to almost completely black, often pale brown to brown laterally, especially adjacent to compound eyes; ocelli pink; compound eyes brown; anteclypeus pale brown to black; rostrum brown, dark brown apically, extending to posterior margins of mid coxae; antennae brown to dark brown.

Thorax: Pronotum brown to pale brown, sometimes with mottled dark brown to black colouration surrounding paramedian and lateral fissures and on lateral margins; central fascia brown to pale brown, surrounded with black colouration, which broadens conspicuously towards anterior pronotal margin; pronotal collar mostly brown to pale brown, sometimes tending dark brown to black anteriorly, and typically dark brown to black on lateral angles; metanotum dark brown; mesonotum brown or pale brown; submedian sigilla black, or occasionally dark brown; lateral sigilla dark brown to black with diffuse reddish-brown or pale brown areas; cruciform elevation and wing grooves pale brown, sometimes dark brown anteriorly; posterior third of mesonotum with dense fine and sparse long silver pubescence.

Wings: Fore wings hyaline; basal cells predominantly light grey to grey, occasionally with yellow-brown intrusions; pterostigmata pale brown to diffuse orange-red; costal veins pale brown; other veins pale brown to brown, darker distally. Hind wing plagas and jugal folds translucent, cream to grey, hyaline apically; veins pale brown throughout.

Legs: Fore coxae entirely pale brown, or with anterior outer sides brown and posterior sides pale brown with dark brown longitudinal markings; mid and hind coxae pale brown, sometimes with dark brown markings on anterior and posterior sides; meracantha spikes pale brown to brown, often dark brown basally, overlapping opercula; fore femora pale brown with brown to dark brown longitudinal markings on outer anterior and sometimes posterior sides; mid and hind femora pale brown to brown, with brown to dark brown longitudinal markings on dorsal sides, pale brown apically; fore tibiae brown with pale brown areas, or entirely dark brown; mid and hind tibiae pale brown, sometimes with narrow brown to dark brown longitudinal markings; fore tarsi brown; mid and hind tarsi pale brown; pretarsi brown to dark brown; claws pale brown, darker apically.

Opercula (Fig. 1P): Broadly rounded; pale brown; plates undulating with medial areas slightly depressed.

Timbals (Fig. 21H): Anterior rib 5 vestigial; rib 4 abbreviated, with a prominent isolated remnant extension ventrally; ribs 1 and 2 joined ventrally and fused dorsally to basal spur; anterior termination of basal spur fused with ribs 3–4, with rib unattached; prominent intercalary short ribs in medial areas between ribs 1 and 2, 2 and 3, and 3 and 4 (three in total).

Abdomen: Tergite 1 dark brown; tergite 2 wider along dorsal midline than tergites 3 to 7; tergite 2 entirely dark brown, or dark brown with brown to pale brown dorso-lateral areas extending to the posterior margin; tergites 3 to 7 entirely dark brown or brown to pale brown with dark brown medial areas, narrowing and becoming diffuse towards posterior margins; tergite 8 entirely dark brown, or dark brown with brown to pale brown dorso-lateral areas extending to the posterior margin; tergites 2 to 8 with dense short silver pubescence on dorso-lateral sides and with extensive long and short silver pubescence on lateral sides; intersegmental membranes pale yellow-brown; epipleurites pale brown to brown, often darker anteriorly, with sparse silver pubescence; sternite II black laterally, tending pale brown ventro-laterally, with a dark brown area medially; sternites III to VI pale brown with variable brown to dark brown areas medially, sometimes diffuse; sternite VII dark brown, typically with pale brown to brown lateral and posterior margins; sternite VIII dark brown, paler apically; anterior sternites visible in lateral view.

Genitalia (Figs 22O, P): Pygofer dark brown to black; upper lobes in ventral view relatively linear, with terminals directed dorsally and apically acute; basal lobes mildly swollen anteriorly and laterally; median lobe of uncus rounded, protruding gradually; claspers in ventral view conspicuous, diverging from point of downward deflection, with sharply developed apices; pseudoparameres projecting further (ventrally) than endotheca and ventral support; ventral support acute, projecting slightly beyond endotheca; endotheca fleshy.

Female (Plate 16D). Head matches description of male.

Thorax: Pronotum pale brown; central fascia pale brown, surrounded with a narrow area of dark brown to black colouration, which broadens towards anterior pronotal margin; pronotal collar mostly pale brown, tending dark brown on margins of lateral angles; metanotum dark brown; mesonotum pale brown; submedian sigilla brown to black, sometimes pale brown over posterior half; lateral sigilla pale brown to dark brown, typically with diffuse

pale brown areas throughout; cruciform elevation and wing grooves pale brown; posterior third of mesonotum with dense fine and sparse long silver pubescence.

Wings: Fore wings hyaline; basal cells light grey, rarely with a scattering of orange; pterostigmata pale grey-brown with diffuse orange intrusions; veins, including costal vein, pale brown, tending brown distally. Hind wing plagas and jugal folds translucent, cream, hyaline apically; veins pale brown throughout.

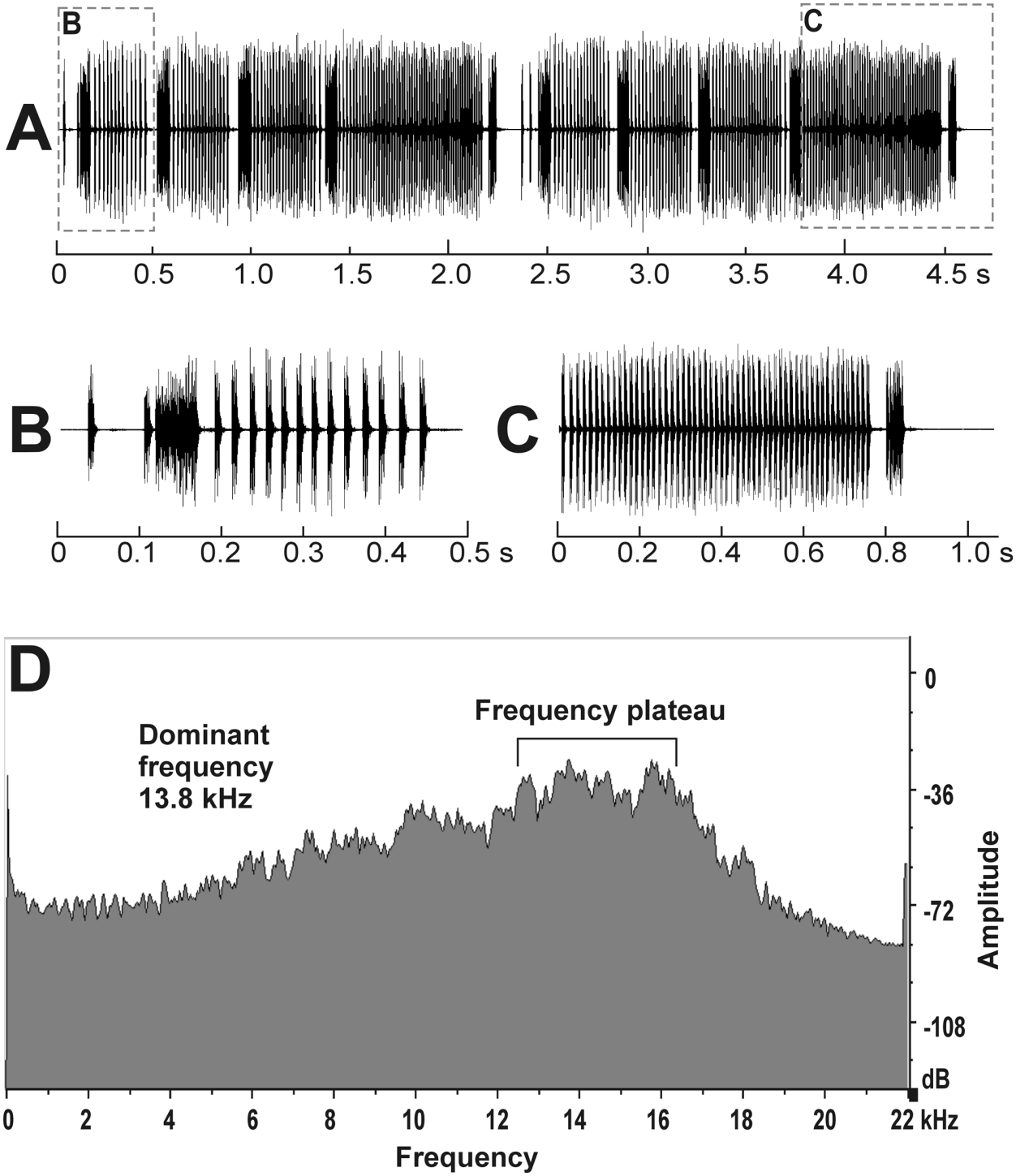

FIGURE 34. Male calling song structure of *Myopsalta xerograsidia* **n. sp.** from a recording obtained at 4.3 km W. of Cloncurry River (20°43'S 140°27'E) by A. Ewart using RS3 (see Methods). (A) Wave plot of two complete phrases, each containing four subphrases followed by a short echeme. (B) Expanded wave plot showing the detailed structure of the introductory subphrase. (C) Expanded wave plot showing the detailed structure of the final subphrase followed by the short echeme. (D) Spectrogram showing the highest amplitude frequency plateau and dominant frequency.

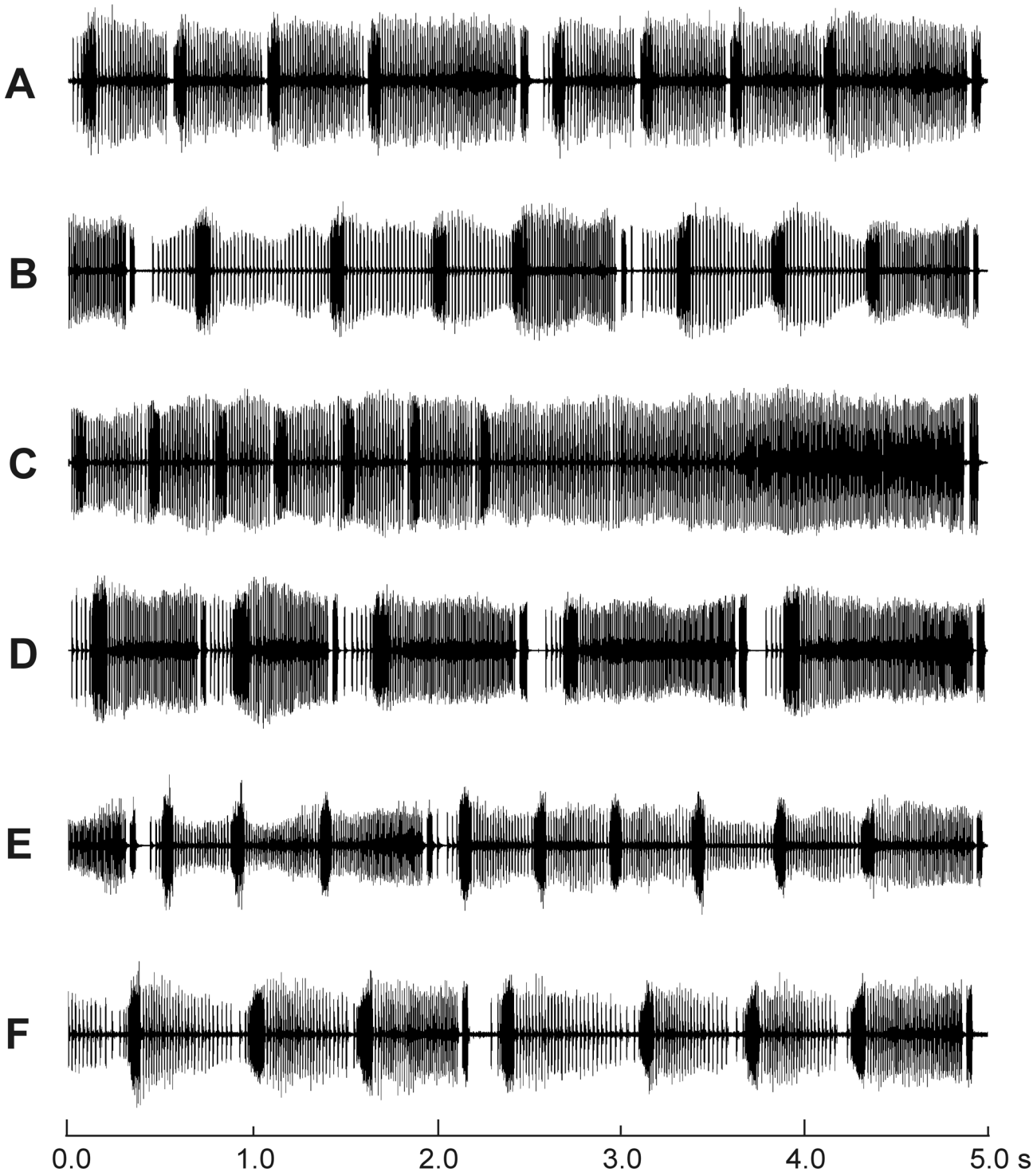

FIGURE 35. Wave plots illustrating the calling song of *Myopsalta xerograsidia* **n. sp.** from six different locations, including (A) Laura River (15°35'S 144°27'E), (B) Herberton (17°21'S 145°25'E), (C) Musselbrook (18°37'S 137°59'E), (D) 8 km W. of Alice Springs (23°42'S 133°48'E), (E) Cravens Peak (23°10'S 138°14'E), and (F) Surat (27°09'S 149°04'E). Recordings were obtained by the author using RS1 (B), RS2 (F) and RS6 (A), and by A. Ewart using RS3 (C) and RS4 (D, E) (see Methods).

Legs: Fore coxae pale brown; mid and hind coxae pale brown, sometimes with brown markings on anterior sides; meracantha spikes pale brown to brown, often dark brown basally, overlapping opercula; fore femora pale brown with brown to dark brown longitudinal markings on inner and sometimes outer anterior sides; mid and hind femora pale brown to brown, with brown to dark brown longitudinal markings on anterior sides, pale brown apically; fore tibiae brown with pale brown areas; mid and hind tibiae pale brown; fore tarsi pale brown to brown; mid and hind tarsi pale brown; pretarsi brown to dark brown; claws pale brown, darker apically.

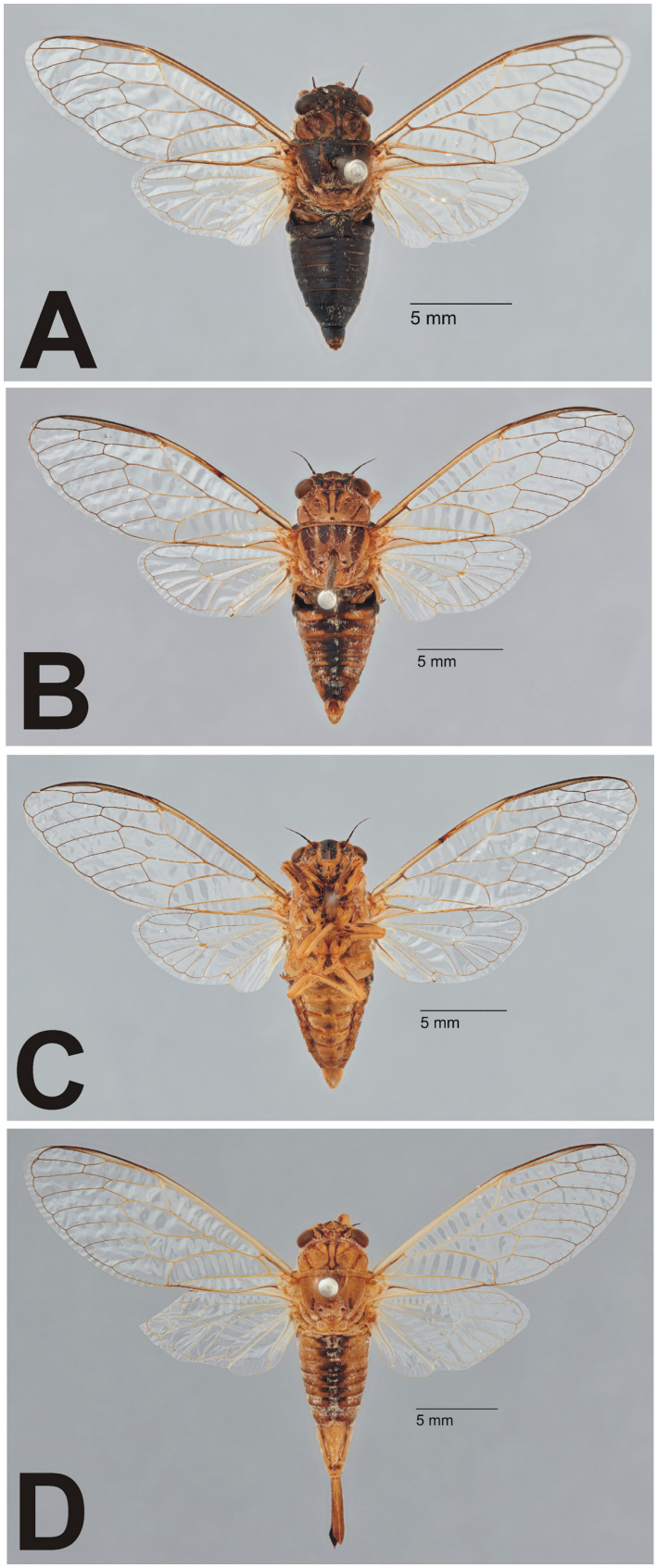

PLATE 16. *Myopsalta xerograsidia* **n. sp.**: (A) male paratype, 22.5 km E. of Alice Springs (23°46'S 134°04'E), dorsal view; (B) male holotype, 4.3 km W. of Cloncurry River (20°43'S 140°27'E), dorsal view; (C) male holotype, ventral view; (D) female, 10.1 km E. of Cloncurry (20°44'S 140°38'E), dorsal view.

Abdomen: Tergite 1 brown to dark brown; tergites 2 to 8 pale brown, with brown to dark brown areas medially, broader on anterior half and tending reddish-brown on posterior half, narrowing towards posterior margin; auditory capsules dark brown to black; abdominal segment 9 pale brown, with dark brown dorso-lateral longitudinal markings; dorsal beak dark brown, sharply defined; sternite II pale brown; epipleurites pale brown; sternites III to VI pale brown with narrow brown to dark brown areas medially, broadening posteriorly; sternite VII pale brown; ovipositor sheath extends approximately 2.7–4.5 mm beyond termination of abdominal segment 9.

Measurements. N=15♂ 15♀. Ranges and means (in parentheses), mm; BL: ♂ 12.1–14.9 (13.6); ♀ 17.5–21.1 (19.0). FWL: ♂ 13.2–16.9 (15.4); ♀ 16.3–20.6 (17.9). HW: ♂ 3.5–4.3 (4.0); ♀ 4.0–4.5 (4.2). PW: ♂ 3.5–4.4 (4.0); ♀ 4.1–4.9 (4.4). AW: ♂ 4.0–4.8 (4.5); ♀ 4.0–5.0 (4.6). FWL/W: ♂ 2.49–2.89 (2.70); ♀ 2.55–3.08 (2.80). OL: ♀ 8.4–10.9 (9.8).

Morphological distinguishing features. *Myopsalta xerograsidia* **n. sp.** can be distinguished from all other species in the genus apart from *M. atrata*, *M. binotata*, *M. chrysopedia* **n. sp.**, *M. coolahensis*, *M. gordoni* **n. sp.**, *M. lactea*, *M. libritor*, *M. parvula* **n. sp.** and *M. waterhousei* by the colour of the basal membranes of the fore wings, which is mainly white to pale grey (cf. pale brown or pale orange). It can be distinguished from *M. binotata*, *M. coolahensis*, *M. lactea*, *M. libritor* and *M. waterhousei* by having completely hyaline fore wings (including the basal cells). Males and females can be separated from *M. chrysopedia* **n. sp.** by having a head width <4.6 mm. Males can be separated from *M. atrata* by the colouration of the posterior margins of the tergites and also the lateral edges of the sternites, which is pale brown rather than orange. They can be differentiated from the superficially similar *M. gordoni* **n. sp.** by the colour of sternite VII, which is dark brown centrally with contrasting pale brown margins (cf. uniform dark brown to black in *M. gordoni* **n. sp.**). They can be separated from *M. parvula* **n. sp.** by the colouration on the lateral halves of sternites III–V, which is predominantly pale brown rather than almost exclusively dark brown. Females can be separated from *M. atrata* and *M. parvula* **n. sp.** by the long ovipositor sheath, which extends 3.0–4.5 mm beyond the termination of abdominal segment 9 (cf. <0.5 mm in *M. atrata*). They can be distinguished from the similar *M. gordoni* **n. sp.** by the colouration of the lateral edges of the sternites, which is pale brown rather than reddish-brown.

Distribution, habitat and behaviour (Fig. 28). *Myopsalta xerograsidia* is the most widespread species in the genus, being found from southern Queensland (Surat) north to drier coastal and subhumid inland areas to Cape York and west to through much of the Northern Territory (though avoiding the humid Top End and the arid far south) to the Kimberley region, with an isolated population in the Pilbara of Western Australia. Populations occur in open grassland, grassy woodland, roadsides and river channels where the adults are typically found on low vegetation, particularly in grass. Adults have been encountered between September and May.

Calling song (Figs 34, 35). This species exhibits a high-pitched, 'reeling' song, with a distinct build-up and variable phrase duration. Each phrase is composed of an introductory syllable or syllable sequence followed by a series of 2–10 subphrases (all statistics, *n*=62 recordings). On infrequent occasions only a single subphrase is produced. The introductory syllable sequence contains a series of 1–10 (rarely up to 18) syllables (0.005–0.011 s duration) separated by successively decreasing gaps (0.005–0.057 s duration), with a total duration of 0.014–0.354 s. In some instances, the introductory syllable sequence is omitted and the phrase commences abruptly the first subphrase. Each subphrase comprises a long echeme (0.043–0.152 s) followed by a long syllable sequence with gaps of 0.004–0.017 s between each syllable and a total duration of 0.080–0.695 s. The final subphrase of each phrase typically exhibits a more condensed syllable sequence, with gaps between each syllable of 0.002–0.020 s and an extended total duration of 0.096–2.559 s. This is followed by a gap of 0.012–0.041 s, a short echeme of 0.019–0.052 s and a longer gap of 0.023–0.161 s duration. It is expected that the female would respond during the long gap following the short echeme; however this interactions has not yet been recorded in this species. Occasionally, the gap at the end of the final subphrase is interrupted by an additional syllable.

The calling song is produced with a persistent level of amplitude throughout. It also maintains an even frequency distribution, without apparent modulation, exhibiting a high amplitude plateau within the bounds of 11.6 and 17.8 kHz, typically 12.1–16.2 kHz.

The song recordings of this species show remarkably consistent structure considering the widespread distribution of this cicada, a phenomenon noted for some other arid zone cicadas including *Arenopsaltria nubivena* (Walker) (Ewart *et al.*, 2015a) and *Simona erema* Ewart, Popple and Marshall (Ewart *et al.*, 2015b). The most notable anomaly is present in the recordings from near Alice Springs, which differ in that the syllable sequences within each subphrase exhibit successively decreasing gaps between each syllable. This trait is not present in the recordings from populations further to the east.

Discussion

Cicadas in the *Myopsalta crucifera* species group exhibit generally subtle morphological differences, with colour pattern providing most of the distinguishing characters between species. As documented in related genera (e.g. *Chelapsalta*, *Simona*, *Ewartia*), the male genitalic structures tend to be rather simple and poorly differentiated (Ewart *et al.*, 2015b; Popple, 2017). Differences in size, appearance and other body structures do, nevertheless, allow identification to species level for each of the taxa documented in this study.

Myopsalta cicadas occupy a diverse range of Australian habitats, including open forests and woodlands, *Acacia*-dominated scrublands, tropical, temperate and semi-arid grasslands. Calling males remain fairly stationary and appear to move relatively infrequently between singing stations. However they can also be exceedingly wary and will easily fly 5–30 m or further at the first sign of disturbance. They can be readily attracted to light, usually in small numbers.

Given the gross morphological similarities of cicadas in the *Myopsalta crucifera* species group, it would seem reasonable to expect that the males would produce calling songs with highly comparable structures. Indeed, in a large study such as this, it would typically be customary to provide a synopsis of calling songs, for example, by statistical analysis. However, the calling songs of these cicadas were found to differ markedly in structure to the point where not directly comparable. Furthermore, in some examples, the durations of even some of the most basic of parameters (e.g. phrase duration) was found to be too variable to be repeatable for comparative purposes. Therefore, a statistical analysis was precluded in this case. Nevertheless, the song structures of the various species can still be grouped in a qualitative sense.

Cicadas in the *Myopsalta crucifera* species group can be grouped into four broad song types. These include:

1. Phrases of consistent duration dominated by a long echeme
2. Phrases of consistent duration with multiple echemes
3. Phrases of variable duration with sequences of macrosyllables
4. Phrases of variable duration with long and short subphrases

These song types are not intended to necessarily reflect or predict phylogenetic relationships in the species group (a topic that has yet to be investigated), although relatedness would undoubtedly be influential in some cases where songs are similar. The groupings are, nonetheless, helpful for facilitating comparison between the calling song structures of the different species. A comparative example of single phrases from each of the species in the *M. crucifera* species group classified by song type is provided in Figure 36. Further discussion on the examples from each song type in provided in the following subsections.

1. Phrases of consistent duration dominated by a long echeme (Figs 36A–E)

This song type includes the typical day calling songs produced by *M. atrata*, *M. bassiana* **n. sp.**, *M. crucifera*, *M. leona* **n. sp.** and *M. umbra* **n. sp.** The phrases in these calling songs are characterised by a syllable sequence, which then coalesces into a long echeme and ends in a macrosyllable. There is often a significant amplitude modulation, which is particularly evident in *M. atrata*, *M. bassiana* **n. sp.**, *M. umbra* **n. sp.** and *M. leona* **n. sp.** (Figs 36A, C–E), but less so in *M. crucifera* (Fig. 36B). Uniquely, in the case of *M. leona* **n. sp.**, the highest amplitude occurs part-way through the long echeme (Fig. 36E), whereas in *M. atrata*, *M. bassiana* **n. sp.**, *M. umbra* **n. sp.**, it occurs towards the end. The call of *M. atrata* stands other from the other examples in two ways. Firstly, the delineation between the syllable sequence and the long echeme is unclearly defined, with the syllables showing incomplete coalescence during the long echeme. Indeed, during the first description of the calling song, Emery *et al.* (2015) interpreted the entirety of each phrase as a syllable sequence. Secondly, it is typical for the macrosyllable at the end of each phrase to be preceded by a short gap; however in *M. atrata* there is no such gap (Fig. 36A). It is clear that *M. atrata* produces the most divergent form of this song type.

The species that produce this song type are found in range of different habitat types. Notably, it is evident that both *M. bassiana* **n. sp.** and *M. umbra* **n. sp.** produce closely similar calling songs (Figs 36C, D); however these are associated with grassy woodland and vine thicket, respectively, which are very different habitat types.

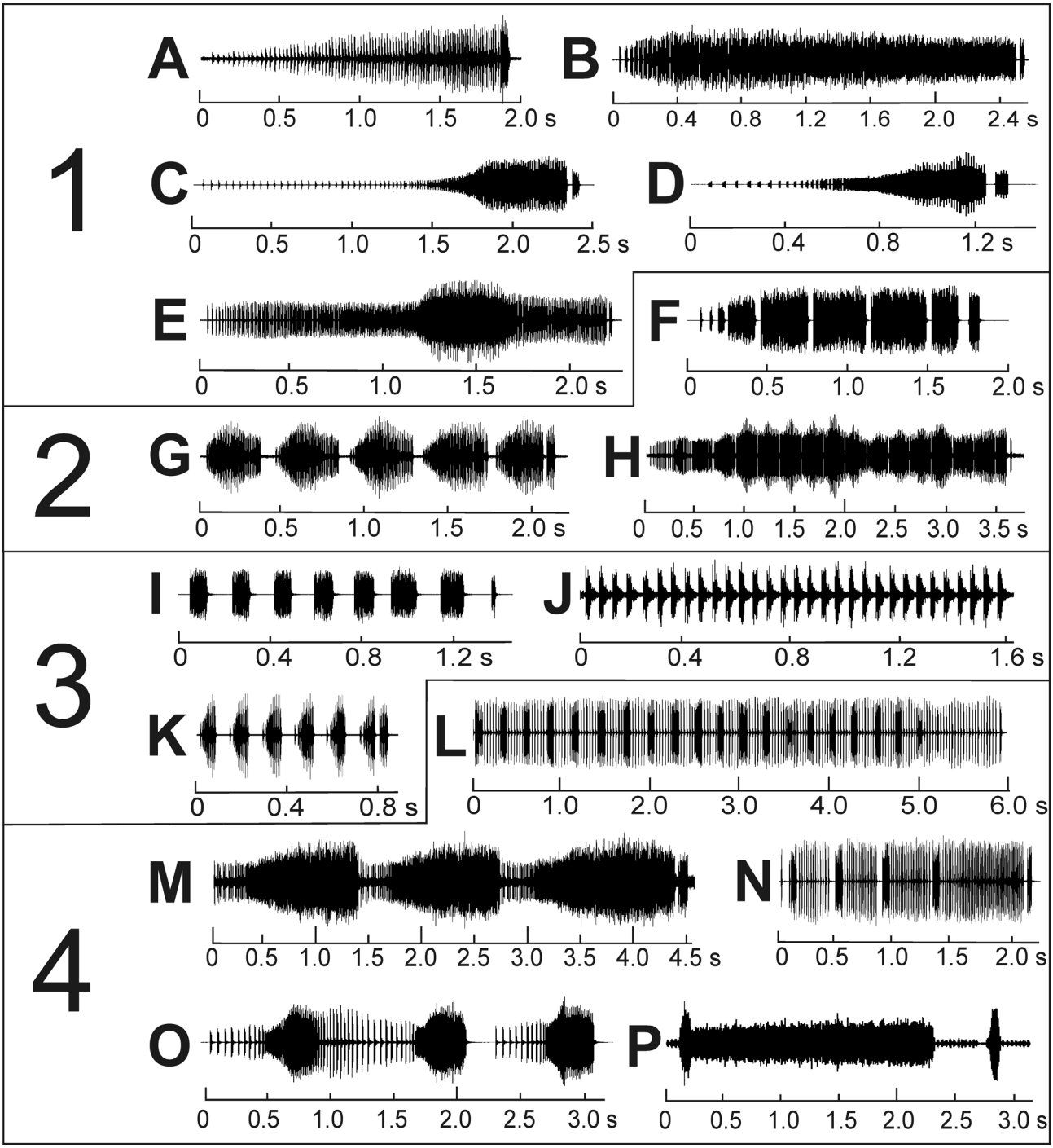

FIGURE 36. Wave plots comparing the structure of single calling song phrases between species in the *Myopsalta crucifera* (Ashton) species group. The songs are grouped by according to song type (1–4; see explanation in Discussion), including (A) *M. atrata* (Goding & Froggatt), Audley (34°07'S 151°04'E); (B) *M. crucifera*, Woodgate (25°06'S 152°33'E); (C) *M. bassiana* **n. sp.**, Acton (35°16'S 149°07'E); (D) *M. umbra* **n. sp.**, Yarraman (26°49'S 151°57'E); (E) *M. leona* **n. sp.**, Eidsvold (25°22'S 151°08'E); (F) *M. mackinlayi* (Distant), Boomer Range (23°12'S 149°45'E); (G) *M. majurae* **n. sp.**, Mt Majura–Mt Ainslie (34°15'S 149°11'E); (H) *M. longicauda* **n. sp.**, Possum Park (26°30'S 150°06'E); (I) *M. platyptera* **n. sp.**, Brigalow Research Station (24°49'S 149°45'E); (J) *M. melanobasis* **n. sp.**, Maclagan (27°05'S 151°38'E); (K) *M. albiventris* **n. sp.**, Mt Moffatt (25°12'S 148°59'E); (L) *M. parvula* **n. sp.**, Acton (35°16'S 149°07'E); (M) *M. riverina* **n. sp.**, Rankins Springs (33°55'S 145°56'E); (N) *M. xerograsidia* **n. sp.**, 4.3 km W. of Cloncurry River (20°43'S 140°27'E); (O) *M. septa* **n. sp.**, Tannymorel (28°19'S 152°08'E); (P) *M. gordoni* **n. sp.**, 82 km N. of St George (27°23'S 148°52'E). Recordings were obtained by the author using RS1 (B, D, E, H, K), RS2 (A, J, O, P), RS5 (C, G, L, M) and by A. Ewart using RS3 (I, N) (see Methods).

2. Phrases of consistent duration with multiple echemes (Figs 36F–H)

Song type 2 is similar to song type 1, with repetitive phrases, each ending in a macrosyllable. The main difference is that the build-up to the macrosyllable comprises a series of echemes of similar duration. In addition, there is more limited amplitude modulation that seen in some example of song type 1. Song type 2 includes the typical day calling songs produced by *M. mackinlayi*, *M. longicauda* **n. sp.** and *M. majurae* **n. sp.** In each of these species, the number of macrosyllables in each phrase tends to be fairly consistent, although *M. majurae* **n. sp.**, in particular, sometimes exhibits small amounts of variation between successive phrases. Unlike *M. mackinlayi* and *M. majurae* **n. sp.**, the calling song of *M. longicauda* **n. sp.** (Fig. 36H) is notable for its small amplitude fluctuations within each echeme, which give the song a wavering quality. Indeed, although minor, these rapid fluctuations can have an almost ventriloquial effect, making it difficult for the observer to judge where the call is originating from.

Each of the species that produce this song type occurs in similarly structured, dry woodland, shrubby open forest or open scrubland habitats.

3. Phrases of variable duration with sequences of macrosyllables (Figs 36I–K)

The third song type in this species group is dominated by sequences of echemes (or syllables), each of consistent duration. In this respect it is similar to song type 2, except that the phrase endings are often abrupt and/or subtle, and difficult to anticipate due to the characteristically variable duration of the phrases. Consequently, unlike song types 1 and 2, the phrase types in song type 3 are only identifiable by their overall composition, not both their composition and duration. Examples that fit into this broad song type include *M. albiventris* **n. sp.**, *M. melanobasis* **n. sp.** and *M. platyptera* **n. sp.** Two of these species, *M. melanobasis* **n. sp.** and *M. platyptera* **n. sp.**, are closely similar in morphology and occupy the same habitat (brigalow scrubland/ woodland), so it is perhaps not surpising that they share similar calling song strutures. They both produce long sequences of sounds (short macrosyllables in the case of *M. melanobasis* **n. sp.** (Fig. 36J), long macrosyllables or short echemes in the case of *M. platyptera* **n. sp.** (Fig. 36I). In the former, these are interrupted by slightly extended gaps, whereas in the latter they are interrupted by a short macrosyllable, but overall the structures are similar. The calling song of *M. albiventris* **n. sp.** has a broadly similar structure except that the macrosyllables are often preceded closely by one or two syllables (Fig. 36L), and each phrase ends with a distinct double macrosyllable. That species occurs in grassy woodland habitats.

4. Phrases of variable duration with long and short subphrases (Figs 36L–P)

The fourth and final song type contains most of the more complex examples in the species group. The calling songs of *M. gordoni* **n. sp.**, *M. parvula* **n. sp.**, *M. riverina* **n. sp.**, *M. septa* **n. sp.** and *M. xerograsidia* **n. sp.** all fit broadly into this song type category. Like song type 3, the phrases are variable in duration; however they differ from the other subtypes in having both long and short repeated units within each phrase, so these are referred to as subphrases.

The calling song phrases of *M. parvula* **n. sp.**, *M. riverina* **n. sp.** and *M. xerograsidia* **n. sp.** all start with sets of repeated short subphrases and end with a longer subphrase. The song structures of *M. parvula* **n. sp.** and *M. xerograsidia* **n. sp.**, in particular, are broadly similar (Figs 36L, N). Both of these species inhabit grass or low shrubs in grassland/ grassy woodland. The song structure of *M. riverina* **n. sp.** differs in being dominated by echemes with notable amplitude modulation (Fig. 36M), like an extended version of the phrases of *M. crucifera* or *M. leona* **n. sp.** (Figs 36B, E). It occurs in mallee woodland.

Of all of the calling songs in the *M. crucifera* species group, *M. septa* **n. sp.** proved to be the most difficult to define in terms of phrase structure. Multiple short subphrases and/or long subphrases can be emitted in succession (one example of each in Fig. 36O). Despite the variability in repetition pattern, the structure of the subphrases themselves is consistent, with the long subphrases effectively being extended (‘double’) versions of the short subphrases. This species occurs in grassland and has a similar calling song to *M. waterhousei* (Distant), which occupies the same type of habitat (L.W. Popple, unpublished field recordings and observations).

The final example with a comparatively simple calling song is *M. gordoni* **n. sp.**, a species of dry woodland/ scrublands. In this species, the phrases are interpreted to commence with the long subphrase (a single long echeme) and end with one or more shorter subphrases (short echemes; Fig. 36P). This species and *M. septa* **n. sp.** may be the only examples in the *M. crucifera* species group that sometimes produce multiple cues for the female to respond

(with timed wing flicks) in the gaps following each short subphrase. All of the other examples in the group (Figs 36A–N) seem to have a single cue for the female to respond in each phrase, which occurs in the gap after the final macrosyllable.

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