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Research Article

The cicada genus *Albanycada* Villet, 1989 (Hemiptera, Cicadidae): systematic revision

Martin H. Villet[1,2], Terence A. Bellingan[1,3], Benjamin W. Price[1,4]

1 *Department of Zoology & Entomology, Rhodes University, Makhanda, South Africa*
2 *Research and Exhibitions Department, South African Museum, Iziko Museums of South Africa, Cape Town, South Africa*
3 *Albany Museum, Makhanda, South Africa*
4 *Department of Entomology, The Natural History Museum, London SW1 5BD, UK*
Corresponding author: Martin H. Villet (martin.villet@gmail.com)

Abstract

Phylogenetic analysis of the nucleotide sequences of the cytochrome oxidase I gene of specimens of *Albanycada* Villet, 1989 supported the hypothesis that the genus includes more than one species-level lineage. Comparison of the syntype of *Platypleura albigera* Walker, 1850, the type species of *Albanycada*, with the syntypes of *Platypleura membranacea* Karsch, 1890 confirmed that the two species are synonyms, so the other lineage is described under the name *Albanycada bellinganorum* Villet & Price, **sp. nov.** Lectotypes are designated for *P. albigera* Walker, 1850 and *P. membranacea* Karsch, 1890 to reflect these comparisons. Its morphology, geographical distribution, and calling song are illustrated. Ecological and conservation notes are summarised for both species, and their phylogenetic origins are discussed.

Key words: Africa, Albany Centre of Endemism, Albany Thicket Biome, diagnostic key, new species, Platypleurini

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Introduction

The monotypic genus *Albanycada* Villet, 1989 was created for *Platypleura albigera* Walker, 1850 because that species did not correspond to the concept of the genus *Platypleura* Amyot & Serville, 1843 as revised by Boulard (1972), nor did it accord with any other established genus (Villet 1989). Phylogenetic analysis of the Platypleurini confirmed that *Albanycada* is monophyletic and forms the sister group to *Platypleura*, and indicated the existence of a second species of *Albanycada* (Price et al. 2019). *Platypleura membranacea* Karsch, 1890 is currently treated as a junior synonym of *Albanycada albigera* (Villet 1989), so the primary goal of this study is to re-evaluate this synonymy and resolve the taxonomic identity of the second lineage.

A secondary goal is to use the information gathered here to interpret the phylogenetic history, biogeography and conservation status of the species. This entails assessing what is known of their plant associations, physiology, behaviour, phenology, and interactions with human activities.

Materials and methods

The type specimen of *Platypleura albigera* Walker and three type specimens of *Platypleura membranacea* Karsch were examined in the Natural History Museum, London, United Kingdom and the Museum für Naturkunde, Berlin, Germany, respectively. Their labels are described using the symbol "|" to indicate a new line (on a label) and "||" to indicate a new label.

Additional specimens were assembled by opportunistic collecting in the field, and more locality records were gathered from the following African and European collections:

AMGS	Albany Museum, Makhanda, South Africa
HUMB	Museum für Naturkunde, Berlin, Germany
JBPC	Jon Ball private collection, Cape Town, South Africa
NHMUK	Natural History Museum, London, United Kingdom
RPPC	Renzo Perissinotto private collection, Gqeberha, South Africa
SAMC	Iziko South African Museum, Cape Town, South Africa
SANC	National Collection of Insects, Pretoria, South Africa
TMSA	Ditsong Museum, Pretoria, South Africa

The metadata on the labels of these specimens are not cited verbatim. The various date formats were converted to a single unambiguous format. Locality geocoordinates, either obtained from the labels or estimated from maps and gazetteers (e.g. United States Board On Geographic Names 1954, 1972; Skead 1973), were reformatted into decimal degrees. Males are indicated by "♂" and females by "♀".

Nomenclatural notes use the symbols "=" and "≡" to indicate subjective and objective synonyms, respectively. Descriptions of the species of *Albanycada* were compiled using the anatomical terminology of Villet (1989) and Moulds (2005), focusing on taxonomically significant characters. Morphological measurements of *Albanycada bellinganorum* Villet & Price, sp. nov. in millimetres are provided for fore wing length, fore wing width, body length, head width and mesonotum width. The Area of Occupation and Extent of Occurrence of each species were calculated from the distribution records using Geocat (https://geocat.iucnredlist.org/editor). The NCBI GenBank Accession Numbers (Benson et al. 2012) are cited for DNA sequences that underpinned published phylogenetic analyses.

Calling songs of males of *A. bellinganorum* Villet & Price, sp. nov. were recorded in the field using a Zoom H4 Handy Recorder with integrated microphone with a rated frequency response curve that was essentially flat (± 1 dB) in the range of 0.1–18 kHz (full specifications available from Zoom North America, Hauppauge, NY; https://zoomcorp.com/). The songs were visualised as spectrograms and power spectra using Raven Lite 2.0.5 (https://ravensoundsoftware.com/).

Results

Comparison of type specimens of *Platypleura albigera* Walker (Fig. 1A) and *Platypleura membranacea* Karsch (Fig. 2A, D, E) with the specimens sequenced by Price et al. (2019) showed that the type specimens indeed represent the same species and that *Albanycada* sp. 1 *sensu* Price et al. (2019) is an undescribed species. Accordingly, we revise *Albanycada* and describe the new species.

Taxonomy

Platypleurini Schmidt, 1918

Albanycada Villet, 1989

Figs 1–6, 8

Albanycada Villet, 1989: 60, pl. III, fig. 10. Type species: *Platypleura albigera* Walker, 1850: 12, by original designation.

Morphological diagnosis and description. *Albanycada* was described and illustrated by Villet (1989). A defining character is that the male urite (Figs 3B, D, 4D) has a distinctive shape, with the apices of the ventral mediolateral processes turned laterally as in the African species of *Platypleura* Amyot & Audinet-Serville, 1834 *sensu stricto* (*s.s.*), but robust, short, conical and lacking spine-like setae. The urite's lateral lobes are moderately developed and also without dense, spine-like setae (Figs 3B, D, 4D). *Albanycada* differs from *Platypleura s.s.* in that the hind wings are yellowish rather than distinctly orange, and the mediolateral and lateral processes of the uncus are spineless rather than spiny. With a few exceptions (Villet and Edwards 2021), the species of *Platypleura s.s.* have well developed mediolateral processes on the uncus, and fore wings that are (almost) entirely pigmented. In addition, the relatively small body size and some general features of the male genitalia link *Albanycada* to *Platypleura*, *Kongota* Distant, 1904 and their relatives (Boulard 1972).

The median processes of the uncus are very reduced, fused, with a median groove, its basal margins are smoothly curved and swollen, forming a depression beneath anal ring and its apex is atrophied, disappearing between mediolateral processes. The mediolateral processes of the uncus are well developed, with arms separate, appressed to posterior of median processes, tube-like, meeting in midline and tapering apically; apices turned laterally, conical, spineless and unadorned. The lateral processes of the uncus are subtriangular, equilateral, about as long as broad, and without dense setae.

Features of *Albanycada* that are characteristic of Platypleurini in general (Villet 1989; Moulds 2005; Marshall et al. 2018) include the relatively short, broad and slightly flattened body (Figs 1–3); the width of the head across the eyes about equal to that of the mesonotum (Figs 1–3); the small, rounded paranotal lobes; the fore wings with eight apical cells and the hind wings with six apical cells; the proximal spine on the protibia that is pressed against the leg (Fig. 4A); the reniform opercula that almost meet in the midline (Fig. 4B); the apical tergite of the abdomen with a band of whitish tomentum; and pygoferal processes that are vestigial and not visible in profile (Fig. 4C).

Albanycada has a smaller body size relative to related genera. The fore wing of *Albanycada* is more oval than is usual in the Platypleurini, the costal margin is only slightly dilated, and the marginal membranes of the fore- and hind wings are about equal in width (Figs 1, 2A, 3A, C). Other closely related African platypleurine genera (e.g. *Severiana* Boulard, 1972, *Soudaniella* Boulard, 1972, *Munza* Distant, 1904, *Kongota* Distant, 1904, or *Brevisana* Boulard, 1972) have an uncus with a distinctly different structure; no orange or yellowish pigmentation on the hind wings; and sometimes large, angular paranotal lobes (e.g. *Oxypleura*

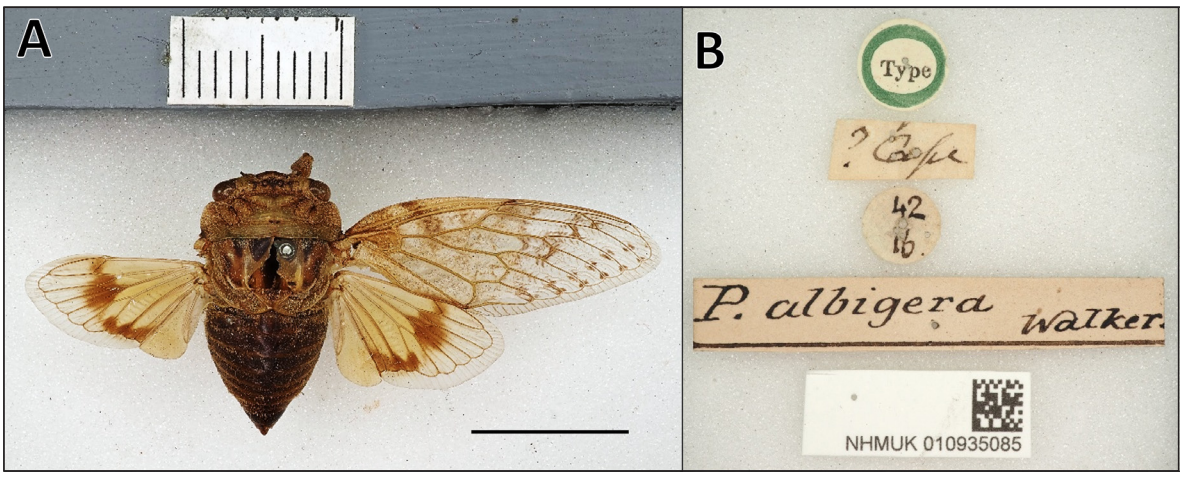

Figure 1. A. Lectotype of *Platypleura albigera* Walker, 1850; **B.** Labels of lectotype. Scale bar: 10 mm.

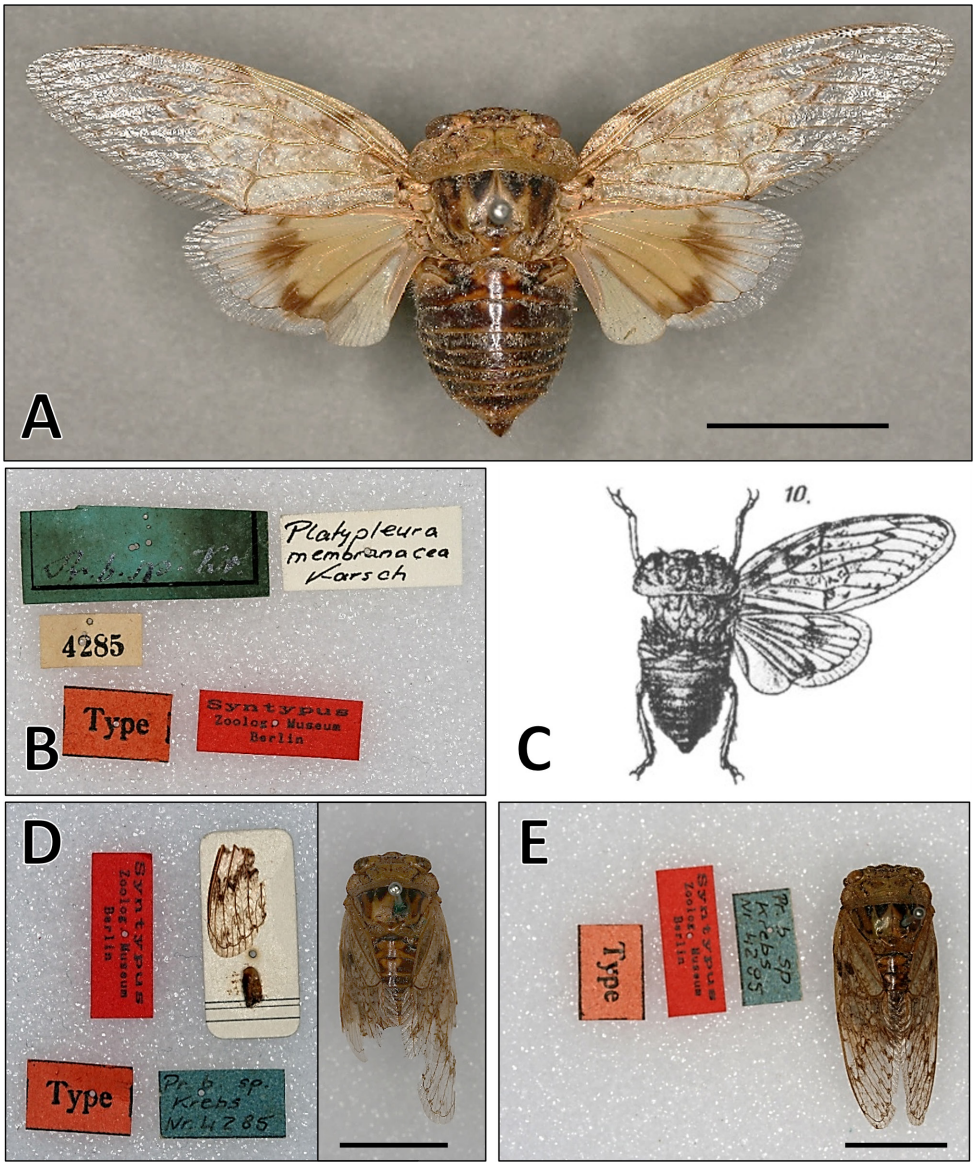

Figure 2. A. Lectotype of *Platypleura membranacea* Karsch, 1890; **B.** Labels of lectotype; **C.** Illustration of *P. membranacea* published by Karsch (1890, plate III, fig. 10); **D, E.** Paralectotypes of *P. membranacea* Karsch, 1890 and their respective labels. Scale bars: 10 mm.

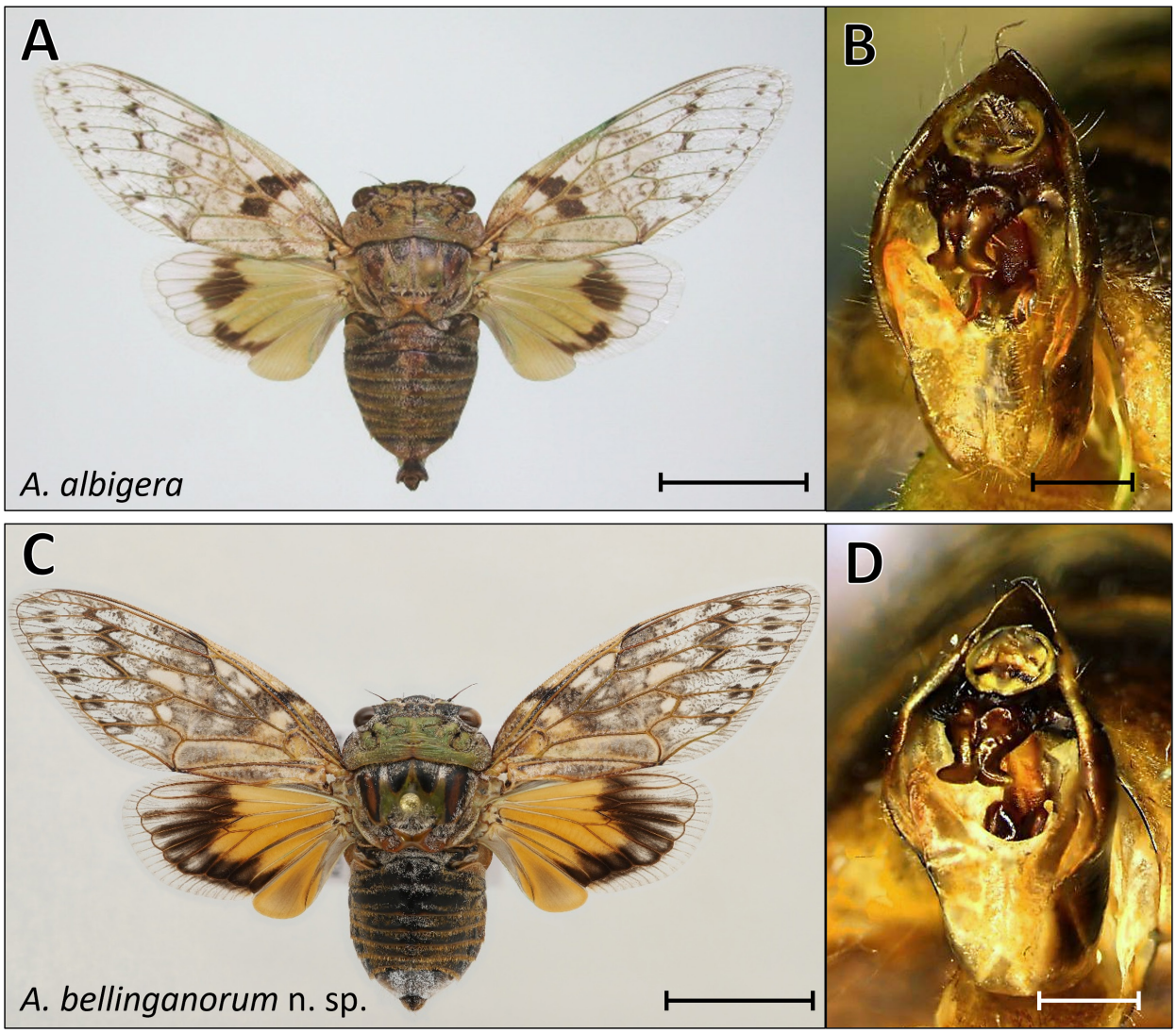

Figure 3. *Albanycada albigera*. **A.** Male habitus; **B.** Male genitalia, oblique ventral view. *Albanycada bellinganorum* Villet & Price, sp. nov. holotype; **C.** Male habitus; **D.** Male genitalia, oblique ventral view. Scale bars: 10 mm (**A, C**); 1 mm (**B, D**).

Amyot & Audinet-Serville, 1843, *Ioba* Distant, 1904, *Sadaka* Distant, 1904) or an unusually wide marginal membrane on the hind wing (*Munza*) (Boulard 1972).

Molecular systematics. The genus may be identified using either four genes (COI, COII, 16S, and EF-1*α*: Price et al. 2019) or 490 nuclear Anchored Hybrid Enrichment loci (Stukel et al. 2026).

Etymology. The name of the genus is formed from "Albany", referring to the historical Albany District of the Cape Province from which the type species originates, and "-cada", a truncated version of the Latin noun "*cicada*", a cicada; it is a grammatically feminine noun denoting a cicada from the Albany region of South Africa (Villet 1989, 60).

Distribution. *Albanycada* is endemic to the Albany Thicket Biome (Kaffrarian Succulent Thicket, Subtropical Thicket, Valley Bushveld: Acocks 1953; Low and Rebelo 1996; Hoare et al. 2006; South African National Biodiversity Institute 2021) in the Eastern Cape and Western Cape provinces of South Africa (Fig. 5).

Discussion. *Albanycada* was estimated to have diverged from its sister genus, *Platypleura s.s.*, in the mid-Miocene, c. 13.5 Ma (Price et al. 2019). It is now endemic to South Africa.

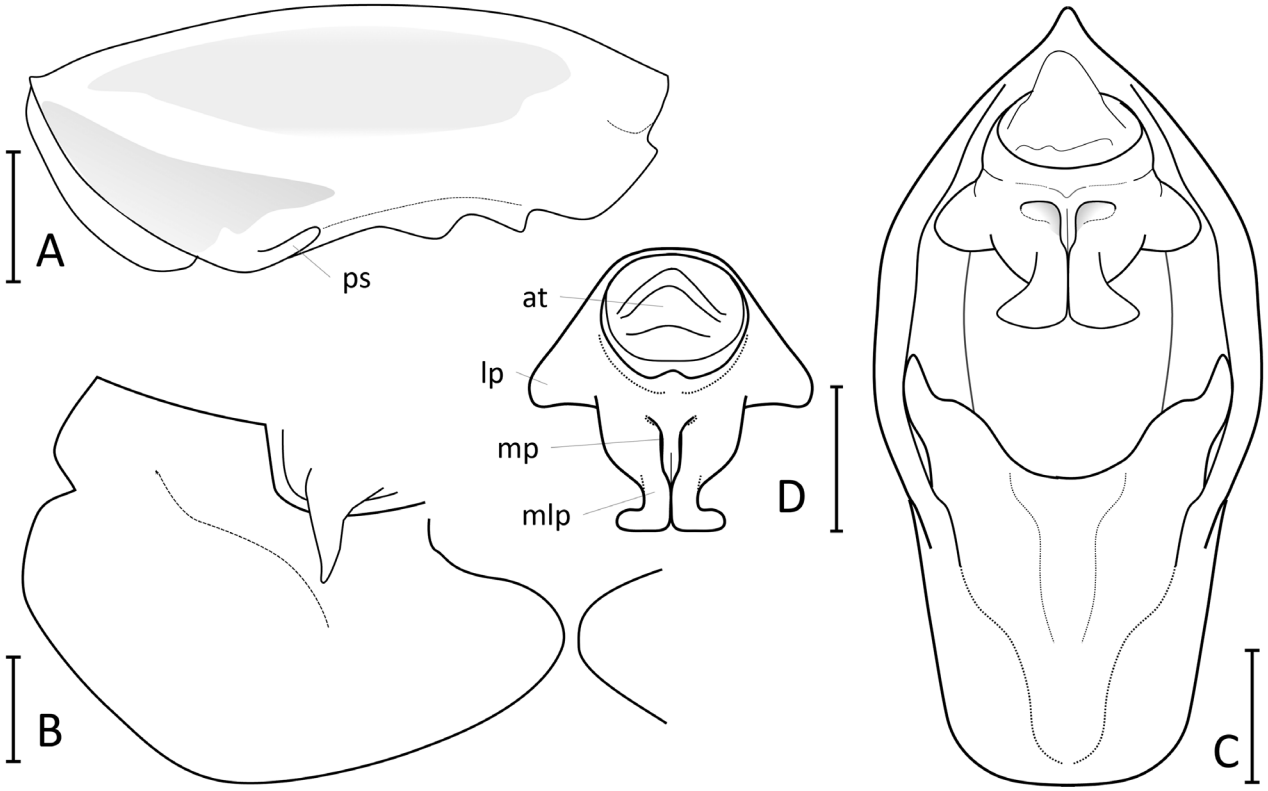

Figure 4. Morphology of *Albanycada bellinganorum* Villet & Price, sp. nov. **A.** Left profemur, mesal view; **B.** Right operculum, ventral view; **C.** Pygofer and urite, ventral view; **D.** Urite, ventral view. Abbreviations: at – anal tube; lp – lateral process; mlp – medial lateral process; mp – median process; ps – proximal spine. Scale bars: 1 mm (**A–D**).

Key to adults of the species included in *Albanycada*

1 Veins in apical areas of hind wing not surrounded by dark markings, apex of hind wing substantially hyaline (Figs 1, 2, 3A) ..... ***A. albigera* (Walker)**

– Veins in apical areas of hind wing surrounded by dark markings, apex of hind wing substantially pigmented (Fig. 3C) ..... ***A. bellinganorum* Villet & Price, sp. nov.**

Albanycada albigera (Walker, 1850)

Figs 1, 2, 3A, B, 5, 6

Platypleura albigera Walker, 1850: 12 [type locality: Cape, clarified as 33°16'S, 26°28'E, a site of known occurrence just north of Makhanda, as motivated below].

≡ *Albanycada albigera* (Walker, 1850) (combination by Villet 1989, 61).

= *Platypleura membranacea* Karsch, 1890: 92 pl. III, fig. 10 [type locality: Cap Bona Spei, clarified as 33°16'S, 26°28'E, a site of known occurrence just north of Makhanda, as motivated below] (synonym by Distant 1906, 16; Villet 1989, 61).

Remarks. *Albanycada albigera* was illustrated by Villet (1989: figs 9–10, habitus, photographs; 25, pygofer, drawing).

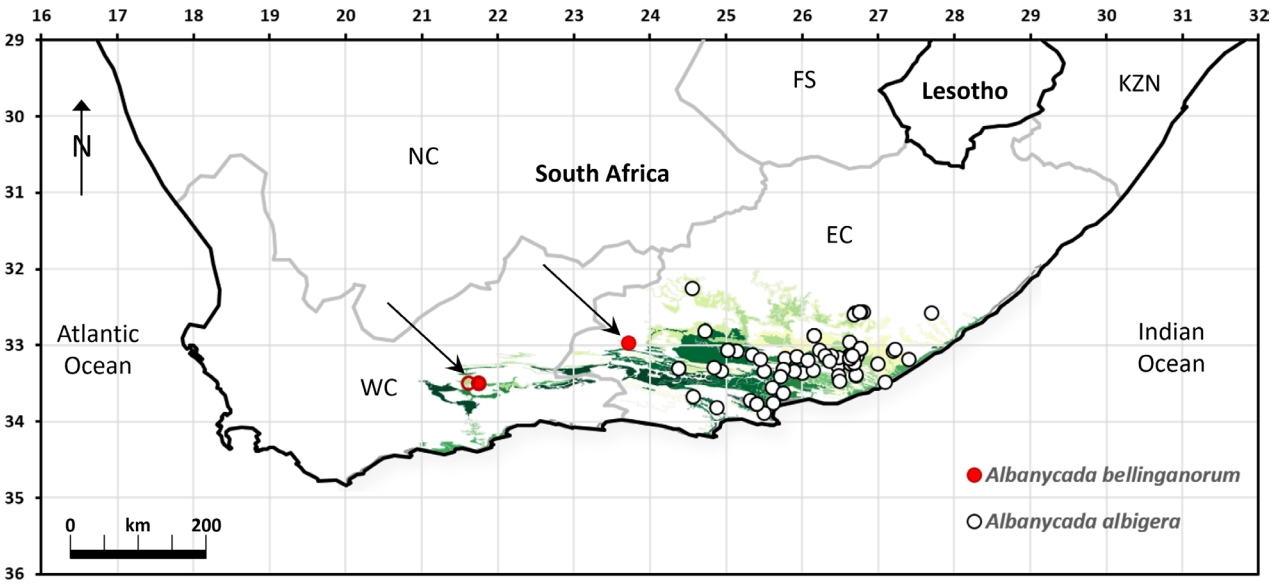

Figure 5. Geographical distributions of the species of *Albanycada* in South Africa relative to the 44 vegetation types in the Albany Thicket Biome (in shades of green). Arrows indicate occurrences of *A. bellinganorum* Villet & Price, sp. nov. Country borders and names are in black; provincial borders are in grey: EC – Eastern Cape, FS – Free State, KZN – KwaZulu-Natal, NC – Northern Cape, WC – Western Cape. Underlying vegetation map by Wikimedia user Maqdisi (CC-BY-SA-4.0).

Platypleura membranacea was illustrated by Karsch (1890: pl. III, fig. 10, habitus, drawing) (Fig. 2C).

Platypleura albigera was apparently described from a single female specimen (Walker 1850), nominated below as the lectotype, that was derived from the collection of William Edward Shuckard (1803–1868), a British entomologist who obtained specimens of non-British species from diverse sources. As was common practice in the era when this species was described, Walker's (1850) description mentioned only the region of origin of the specimen, and the lectotype is now labelled "? Cape" (Fig. 1B), so the vague type locality cannot be inferred more exactly from the labels, description, or collector's details. To clarify (International Commission on Zoological Nomenclature 1999 Article 76) the vague meaning of "Cape", it is proposed here that, since *P. albigera* is a synonym of *P. membranacea*, the two species should share the same type locality.

The syntypes of *P. membranacea* are now labelled "Pr[omontorium]. b[ona]. Sp[ei].", meaning Cape of Good Hope. The provision of the syntypes of *P. membranacea* is credited to Ludwig Krebs (1792–1844) (Karsch 1890), who was the Cape naturalist to the King of Prussia in 1820–1828 and apothecary in Grahamstown in that period, during which he sent 15 significant collections of specimens to the Berlin Museum (ffolliott and Liversidge 1971), including the syntypes, also now labelled "Cap. Bona Spei", of *Platypleura hirtipennis* (Germar, 1934) (Berlin Museum catalogue number 4270), *Platypleura plumosa* (Germar, 1834) (also 4270: Villet 1997) and *Platypleura divisa* (Germar, 1834) (4272), two of which are endemic to the western part of Eastern Cape. Krebs collected in the Sundays River, Albany and Kaffraria regions in 1822 and 1823 (ffolliott and Liversidge 1971), and the syntypes of Germar's (1834) three species were almost certainly collected during these excursions (Villet 1997), so the locality on the labels of all of these specimens (Fig. 2B, D, E) is certainly misleading. It is very likely that the specimens

Figure 6. Live male of *Albanycada albigera* perched on a branch of *Vachellia karroo* (Hayne) Banfi & Galasso. © MH Villet.

were shipped to Germany via Cape Town (ffolliott and Liversidge 1971), which would explain why they became associated with the Cape of Good Hope rather than with what was then known as Kaffraria. Collectively, Krebs' four species are characteristic of an ecological community of cicadas (Gess 1981) that occurs at a site on the north side of Grahamstown, now Makhanda, so it is very likely that the syntypes of *P. membranacea* were collected by Krebs near Makhanda; this site (33°16'S, 26°28'E) is therefore hereby fixed as the restricted type locality of this species (International Commission on Zoological Nomenclature 1999 Article 76).

Type material examined. *Platypleura albigera* Walker: ***Lectotype***, designated here to fix the concept of *Platypleura albigera* Walker and to ensure the universal and consistent interpretation of the same, ♀ (Fig. 1A), left forewing missing: "Type [black print, circular white paper with green submarginal ring] || *P. albigera* | Walker [black print, white paper] || ? Cape [black handwriting, white paper] || [18]42 | 16 [black hand-printing, round white paper label]"; NHMUK 010935085. *Platypleura membranacea* Karsch: ***Lectotype***, designated here to fix the concept of *Platypleura membranacea* Karsch and to ensure the universal and consistent interpretation of the same, ♂ (Fig. 2A), wings outstretched: "Pr[omontarium]. b[ona]. sp[ei]. Kr[ebs]. [black hand-printing, blue card] || Type [black print, red card] || Syntypus | Zoolog. Museum | Berlin [black print, red card] || 4285 (black print, white paper)"; HUMB 4285. ***Paralectotypes***, designated here, 2 ♂♂ (Fig. 2D, E), wings folded, one specimen with pygofer and detached wing

apex mounted on card: "Pr[omontarium]. b[ona]. sp[ei]. | Krebs | Nr. 4285 [black hand-printing, blue card] || Type [black print, red card] || Syntypus | Zoolog. Museum | Berlin [black print, red card]"; HUMB 4285.

Additional material examined. 153 ♂♂; 11 ♀♀. The metadata on the labels of these specimens are not cited verbatim. South Africa – **Eastern Cape** • 1 ♂; 269; 33.126°S, 25.338°E; 3 Jan. 2007; M.H. Villet leg.; AMGS. • 1 ♂; ~5 km NE of Grahamstown on R350; 33.262°S, 26.462°E; 20 Dec. 2009; K. Hill; D. Marshall; M. Villet leg.; AMGS. • 2 ♂♂; 10 km S Seymour; 32.577°S, 26.692°E; 10 Dec. 2005; M.H. Villet leg.; AMGS. • 1 ♂; 10 km S Addo; 33.550°S, 25.600°E; 21 Dec. 1992; J.B. Ball leg.; JBPC. • 1 ♂; 10 km SW Alicedale; 33.360°S, 25.997°E; 12 Jan. 2008; M.H. Villet leg.; AMGS. • 2 ♂♂; 12 km S Seymour; 32.598°S, 26.677°E; 22 Dec. 2006; M.H. Villet leg.; AMGS. • 1 ♂; 130 km E Jansenville; 33.169°S, 25.776°E; 3 Jan. 2007; M.H. Villet leg.; AMGS. • 1 ♂; 140 km E Jansenville; 33.149°S, 25.926°E; 3 Jan. 2007; M.H. Villet leg.; AMGS. • 2 ♂♂; 1 km N Hankey; 33.815°S, 24.878°E; 6 Dec. 2008; M.H. Villet leg.; AMGS. • 1 ♀; 20 km S Fort Beaufort; 32.950°S, 26.617°E; 29 Dec. 1985; M.H. Villet leg.; SANC. • 2 ♂♂; 4 km E Seymour; 32.555°S, 26.800°E; 10 Dec. 2005; M.H. Villet leg.; AMGS. • 1 ♂; 5 km E Alicedale; 33.325°S, 26.142°E; 12 Jan. 2008; M.H. Villet leg.; AMGS. • 2 ♂♂; 60 km S Graaff Reinet; 32.812°S, 24.720°E; 3 Jan. 2007; M.H. Villet leg.; AMGS. • 12 ♂♂; 2 ♀♀; 7 km N Grahamstown; 33.264°S, 26.463°E; 15 Dec. 2001; A. Sanborn & M.H. Villet leg.; AFSC. • 2 ♂♂; 9 km N Salem; 33.401°S, 26.473°E; 25 Dec. 1985; M.H. Villet leg.; SANC. • 1 ♂; Afrique; Delalande leg.; 287; albigera Walk.; Museum Paris Afrique Australe; Delalande; NHMUK. • 3 ♂♂; Andries Vosloo Game Reserve; 33.133°S, 26.717°E; 15 Dec. 1994; M.H. Villet leg.; AMGS. • 1 ♂; Andries Vosloo Game Reserve; 33.133°S, 26.717°E; 26 Jan. 1995; R. Perissinotto & L. Clennell leg.; RPPC. • 1 ♂; Andries Vosloo Game Reserve; 33.134°S, 26.652°E; 2 Dec. 1993; M. Burger leg.; SANC. • 2 ♂♂; Andries Vosloo Kudu Reserve; 33.109°S, 26.674°E; 14 Dec. 2005; J. Midgley & C. Robertson leg.; AMGS. • 2 ♂♂; Barkly Bridge; 33.628°S, 25.741°E; 14 Jan. 1994; M.H. Villet leg.; SANC. • 1 ♂; Baviaanskloof; 33.666°S, 24.564°E; 24 Dec. 1997; R. Perissinotto & L. Clennell leg.; JBPC. • 1 ♂; Blindekloof; 33.719°S, 25.312°E; 21 Nov. 1999; M.H. Villet leg.; AMGS. • 5 ♂♂; Bloukrans Pass; 33.394°S, 26.709°E; 8 Dec. 2004; M.H. Villet leg.; AMGS. • 1 ♂; Bloukranz sic; Bloukrans Pass - north; 33.382°S, 26.707°E; 30 Dec. 2000; M.H. Villet leg.; AMGS. • 3 ♂♂; Cap Bona Spei; no date; Krebs leg.; HUMB. • 1 ♂; Carlisle Bridge; 33.059°S, 26.223°E; 21 Jan. 2001; M.H. Villet leg.; AMGS. • 1 ♂; Clifton Farm; 32.867°S, 26.150°E; 5 Jan. 1981; H.W. Gess leg.; AMGS. • 3 ♂♂; Clifton Farm; 32.867°S, 26.150°E; 15 Jan. 1981; H.W. Gess leg.; AMGS. • 4 ♂♂; Clifton; Grahamstown; 32.867°S, 26.150°E; 15 Jan. 1981; H.W. Gess leg.; AMGS. • 6 ♂♂; Ecca Pass; 33.245°S, 26.633°E; 29 Dec. 1985; M.H. Villet leg.; SANC. • 3 ♂♂; Ecca Pass N.R.; 33.229°S, 26.633°E; 21 Dec. 2001; P. Phillips & M.H. Villet leg.; AFSC. • 2 ♂♂; Ecca Pass NR; 33.245°S, 26.633°E; 8 Jan. 1999; M.H. Villet leg.; AFSC. • 5 ♂♂; Ecca Pass NR; 33.229°S, 26.633°E; 8 Jan. 1999; M.H. Villet leg.; AMGS. • 2 ♂♂; Fish River Pass; 33.236°S, 26.988°E; 5 Jan. 1994; M.H. Villet leg.; SANC. • 2 ♂♂; Fort Brown; 33.132°S, 26.618°E; 18 Jan. 1928; Miss Walton leg.; AMGS. • 2 ♂♂; Fort Brown; 33.132°S, 26.618°E; 30 Jan. 1928; Miss Walton leg.; AMGS. • 1 ♂; Fort Brown; 33.132°S, 26.618°E; 10 Feb. 1928; Miss Walton leg.; AMGS. • 1 ♀; Fort Brown; 33.132°S, 26.618°E; 21 Nov. 1928; Miss

Walton leg.; AMGS. • 1 ♂; 1 ♀; Fort Brown; 33.132°S, 26.618°E; 17 Apr. 1929; Miss Walton leg.; AMGS. • 1 ♂; Fort Brown; 33.132°S, 26.618°E; 18 Jan. 1928; Miss Walton leg.; 5818; Brit. Mus. 1928 – 373; NHMUK 016600100. • 1 ♂; Fort Brown; 33.133°S, 26.618°E; 10 Nov. 1996; R. Perissinotto & L. Clennell leg.; JBPC. • 2 ♂♂; Graaff Reinet; 32.250°S, 24.550°E; 4 Feb. 1988; J.A.W. Coetzer leg.; JBPC. • 1 ♂; Kap River N.R.; 33.478°S, 27.091°E; 20 Dec. 2001; M.H. Villet leg.; AFSC. • 1 ♂; Keiskamma River Pass; N2; 33.068°S, 27.198°E; 6 Feb. 1999; M.H. Villet leg.; AMGS. • 1 ♂; Keiskamma River Pass; N2; 33.048°S, 27.216°E; 26 Dec. 2005; M.H. Villet leg.; AMGS. • 1 ♂; Keiskamma River Pass; R72; 33.184°S, 27.393°E; 10 Dec. 1984; J.A.W. Coetzer leg.; JBPC. • 1 ♂; Kleinpoort; 33.342°S, 24.933°E; 21 Jan. 1996; M.H. Villet leg.; AMGS. • 1 ♂; Koega; 33.75°S, 25.617°E; 25 Nov. 1987; R. Mijburgh leg.; AMGS. • 1 ♂; Kwandwe G.R.; 33.157°S, 26.481°E; 27 Dec. 2002; M.H. Villet leg.; AMGS. • 1 ♂; Lynton Farm; 33.133°S, 26.383°E; 11 Jan. 1982; F. & S. Gess leg.; AMGS. • 2 ♂♂; N Darlington Dam; 33.074°S, 25.141°E; 3 Jan. 2007; M.H. Villet leg.; AMGS. • 1 ♂; N of Hellspoort; 33.139°S, 26.300°E; 1 Jan. 2007; M.H. Villet leg.; AMGS. • 4 ♂♂; N of Steytlerville; 33.302°S, 24.373°E; 21 Dec. 2005; M.H. Villet leg.; AMGS. • 1 ♂; near Bethelsdorp; 33.883°S, 25.500°E; 1 Jan. 1950; C.G.C. Dickson leg.; TMSA. • 1 ♂; near Salem; 33.467°S, 26.483°E; 23 Jan. 1994; R. Perissinotto & L. Clennell leg.; RPPC. • 1 ♂; near Seymour; 32.556°S, 26.767°E; 16 Jan. 1994; R. Perissinotto & L. Clennell leg.; RPPC. • 1 ♂; near Waterford; 33.067°S, 25.017°E; 10 Nov. 1995; R. Perissinotto & L. Clennell leg.; AMGS. • 2 ♂♂; near Waterford; 33.067°S, 25.017°E; 11 Nov. 1995; R. Perissinotto & L. Clennell leg.; RPPC. • 1 ♂; 1 ♀; Noorspoort; 33.300°S, 24.367°E; 21 Jan. 1996; M.H. Villet leg.; AMGS. • 1 ♂; nr Kromriver; 33.335°S, 25.894°E; 12 Jan. 2008; M.H. Villet leg.; AMGS. • 1 ♂; nr Salem; 23 Jan. 1994; R. Perissinotto & L. Clennell leg.; JBPC. • 1 ♂; nr Waterford; 11 Nov. 1995; R. Perissinotto & L. Clennell leg.; JBPC. • 1 ♂; Peninsula Farm; 32.567°S, 27.700°E; AMGS. • 1 ♂; 1 ♀; Pluto's Vale; 33.233°S, 26.683°E; 10 Jan. 1993; M.H. Villet leg.; SANC. • 1 ♀; Pluto's Vale; 33.233°S, 26.683°E; 12 Jan. 1993; M.H. Villet leg.; SANC. • 1 ♂; Port Elizabeth-Uitenhage road; 33.333°S, 25.500°E; 2 Jan. 1950; C.G.C. Dickson leg.; TMSA. • 2 ♂♂; Resolution / Fort Brown; 33.167°S, 26.617°E; Miss A. Walton leg.; AMGS. • 7 ♂♂; Resolution Farm; 33.167°S, 26.617°E; TMSA. • 1 ♂; Resolution; Albany distr.; 33.167°S, 26.617°E; 19 Jan. 1928; [Miss] A. Walton leg.; Brit. Mus. 1955–254; Platypleura sp. nr. albigera Walk., det W.E. China 1954; NHMUK. • 3 ♂♂; 1 ♀; Resolution / Fort Brown; 33.167°S, 26.617°E; 8 Oct. 1926; Miss Walton leg.; AMGS. • 2 ♂♂; Resolution / Fort Brown; 33.167°S, 26.617°E; 30 Dec. 1927; Miss Walton leg.; AMGS. • 1 ♂; 1 ♀; S of Hellspoort; 33.208°S, 26.354°E; 3 Jan. 2007; M.H. Villet leg.; AMGS. • 3 ♂♂; Sam Knott Game Reserve; 33.033°S, 26.767°E; 6 Nov. 1993; JBPC. • 4 ♂♂; Sam Knott Game Reserve; 33.033°S, 26.767°E; 6 Nov. 1993; R. Perissinotto & L. Clennell leg.; RPPC. • 1 ♂; Sam Knott Game Reserve; 33.033°S, 26.767°E; 6 Nov. 1993; R. Perissinotto & L. Clennell leg.; SANC. • 1 ♂; Seymour; 32.556°S, 26.753°E; 14 Jan. 1994; R. Perissinotto & L. Clennell leg.; SANC. • 1 ♂; Seymour; 32.556°S, 26.753°E; 16 Jan. 1994; R. Perissinotto & L. Clennell leg.; SANC. • 1 ♂; Uitenhage; 33.767°S, 25.400°E; no date; P. Martin leg.; AMGS. • 1 ♂; Ulster Farm; 33.133°S, 26.65°E; 6 Dec. 1993; M. Burger leg.; SANC. • 1 ♂; W Riebeck East; 33.198°S, 26.071°E; 3 Jan. 2007; M.H. Villet leg.; AMGS. • 2 ♂♂; Wolwefontein; 33.283°S, 24.833°E; 21 Jan. 1996; M.H. Villet leg.; AMGS. • 1 ♂; Zuurberg;

33.183°S, 25.450°E; 14 Nov. 1993; R. Perissinotto & L. Clennell leg.; SANC. • 2 ♂♂; Zuurberg NP; 33.317°S, 25.750°E; 14 Nov. 1993; R. Perissinotto & L. Clennell leg.; JBPC. • 2 ♂♂; 1 ♀; Zuurberg NP; 33.317°S, 25.750°E; 14 Nov. 1993; R. Perissinotto & L. Clennell leg.; RPPC. • 1 ♂; Zuurberg Pass; 33.403°S, 25.715°E; 17 Jan. 2008; B.W. Price & M.H. Villet leg.; AMGS.

Morphological diagnosis. This species was described by Walker (1850) and Karsch (1890), and illustrated by Villet (1989 figs 9, 10). The external morphology and the male genitalia of *A. albigera* conform to the description of the genus (Figs 1A, 2A, 3A, B). The primary distinguishing feature of this species is the pigmentation pattern of its hind wing (Figs 1A, 2A, 3A).

Morphological description. Male fore wing length 22.4–25.3; fore wing width 9.0–10.5; body length 19.0–21.6; head width 7.7–8.6; mesonotum width 7.9–9.0. Female fore wing length 23.5–24.9; fore wing width 9.2–9.7; body length 19.1–20.2; head width 7.1–7.5; mesonotum width 8.5–9.0.

Head green; with two black stripes running from eye to eye, one through the ocelli and the other across the bases of the antennae. Erect hairs black; recumbent underhairs silvery. Postclypeus green, transverse ridges brown, sulci green. Anteclypeus brown, unmarked. Rostrum brown, blackened apically.

Pronotum green; anterior margin blackened. Pronotal incisures variably black; erect hairs black; recumbent underhairs silvery; collar same colour as pronotum. Mesonotum drab green; the medial obconical spots black, the lateral obconical spots black with chestnut centres, a narrow median line brown, and a pair of spots just anterior to cruciform elevation black; erect hairs black; mesonotal recumbent underhairs silvery; mesoscutellum green. The fore wing has its distal half largely transparent with slight blackening of the subapical crossveins and two submarginal rows of small, dark grey spots that straddle the veins, while the proximal half is pale greyish-green marbled to a variable degree with grey, and with a blackish disco-basal band (e.g. Figs 3A, 6) that varies in intensity, being virtually absent in some specimens (e.g. Figs 1A, 2A; Villet 1989 figs 9, 10); 3rd and 4th ulnar cells usually with a distinct whitish patch towards apex; first and second ulnar cells completely pigmented; costa green; venation green, fading to pale brown, unmarked; setae brown; underhairs black, or silvery. The hind wing has its distal third substantially hyaline, while the basal half and the anal and jugal cells are yellowish-green, fading to greenish-ochre in dead specimens; the intervening area across the bases of the discal crossveins and the apices of the cubital cells is blackish (Figs 1A, 2A, 3A); venation green; crossveins not blackened; limbus hyaline; plaga greyish; jugum uniform. Legs brown; tibia often darker, with a dark brown patch near the proximal joint. Opercula dull brown.

Abdominal tergites very dark brown; the posterior margins pale, recumbent underhairs golden. Timbal cover brown. Circumcaudal tomentum on tergite VIII white, entire. Sternites ochraceous, unmarked, lacking tomentum; sternite I without markings; sternal erect hairs pale; sternal recumbent underhairs silvery.

The sexes are similar in general appearance, apart from usual sexual dimorphism of abdomen. Female sternite VI with posterior margin W-shaped, with a small V-shaped median notch. Pygofer without ventral thorn; caudodorsal beak with apex sharply pointed. Ovipositor sheaths reaching apex of caudodorsal beak; with 15 teeth.

Molecular systematics and phylogenetic history. A divergence time analysis of four genes (genseq-4 16S: GU344078; genseq-4 COI: GU344055; genseq-4 COII: GU344006; and genseq-4 EF-1*α*: GU343825) estimated that *A. albigera* diverged from its sister species about 5 Ma at the start of the Pliocene (Price et al. 2019). About 490 nuclear Anchored Hybrid Enrichment loci are also available for identifying this species (Stukel et al. 2026).

Etymology. "Albigera" is a Latin nominative feminine singular compound adjective formed from the roots *albi-* (from *albus*, white) and *-gera* (from *gerere*, to bear, carry, or wear). The significance of the name is not obvious and may refer to either the band of white tomentum on the abdomen (no longer present on the holotype) or the distal whitish patch in the radial cell of the holotype.

"Membranacea" is a Latin nominative feminine singular adjective from the root *membrāna* (parchment), perhaps referring to the parchment-like appearance of the species' fore wing.

Distribution, ecology and biology. South Africa: Albany Thicket Biome in the southwestern Eastern Cape (Hoare et al. 2006; South African National Biodiversity Institute 2021), from the coast to the Great Escarpment, about 200 km inland (Fig. 5), including the Mesic, Valley, and Arid Thicket types and the Mosaic Thicket with Grassland type, which are all characteristically semi-arid with erratic rainfall (Hoare et al. 2006; South African National Biodiversity Institute 2021).

Specimens perch on *Portulacaria afra* (L.) Jacq., *Euphorbia bothae* Radcl.-Sm., *Euphorbia coerulescens* Haw., *Grewia robusta* Burch., *Euclea undulata* Thunb., *Vachellia karroo* (Hayne) Banfi & Galasso (Fig. 6) and other plants; specimens have also been found perched on wooden fence posts, from which they clearly could not feed, so these plant association records need cautious interpretation. Although the species is a good indicator of its plant community, its broad plant associations make it less responsive to changes like overgrazing (Villet and Capitao 1996).

The species was studied in terms of its calling song (Villet 1989), thermophysiology (Sanborn et al. 2003, 2004) and spermatology (Chawanji et al. 2005, 2006).

Adults are active in October – February, peaking in January.

Males clearly fly between perches, but do not form choruses during the day, and do not show crepuscular singing. The calling song of *A. albigera* is a continuous, sibilant, unmodulated whine characterized as "Tseeeeeeeeeeeeeeeeeeeeeeee … …" (Gess 1981), pitched between 7–12 kHz, emphasized at 9.5 kHz, and with a pulse repetition rate of about 250 Hz (Villet 1989 figs 42, 43) that can be sustained for minutes at a time.

Conservation. Area of Occupation (AOO) 228 km^2; Extent of Occurrence (EOO) 40373 km^2; altitudinal range 15–850 m.a.s.l. Although widespread in the Albany Thicket Biome, this biome is one of the smallest in South Africa. Thicket vegetation is ecologically resistant to many natural perturbations but not resilient to degradation (South African National Biodiversity Institute 2021), and ~50% of it is already transformed, particularly in the eastern parts (Carvalho et al. 2022). The species' IUCN status is Not Evaluated (NE), but Endangered (EN) by AOO criteria and Near Threatened (NT) by EOO criteria.

Conservation measures are indirect, relying on conservation of Spekboomveld and Noorsveld vegetation types. The species occurs in conservation areas

such as Addo Elephant National Park, Baviaanskloof Nature Reserve, Great Fish River Nature Reserve (including Double Drift Game Reserve, Sam Knott Nature Reserve and Andries Vosloo Kudu Reserve) and Ecca Pass Nature Reserve.

***Albanycada bellinganorum* Villet & Price, sp. nov.**
https://zoobank.org/550A21F9-9111-41D5-9D74-F2C1EB3B8E8D
Figs 3C, D, 4, 5, 7, 8

≡ *Albanycada* sp. 1 *sensu* Price et al. (2019, 845).

Type material examined. ***Holotype***, 1 ♂ (Figs 3C, 4, 7); "RSA: Eastern Cape | Miller | Rietfontein Farm | S 32°58'8.76" | E 23°42'54.45" | 12.Dec.2024 | T.A. Bellingan J. Zaayman | J.E. Bellingan A.J. Bellingan || 102190 || HOLOTYPE | Albanycada bellinganorum | Villet & Price"; AMGS. ***Paratypes*** (2 ♂♂), 1 ♂ "RSA: Eastern Cape | Miller | Rietfontein Farm | S 32°58'8.76" | E 23°42'54.45" | 12.Dec.2024 | T.A. Bellingan J. Zaayman | J.E. Bellingan A.J. Bellingan || 102191 || Albanycada bellinganorum | Villet & Price"; AMGS. 1 ♂; "RSA: Eastern Cape | Miller | Rietfontein Farm | S 32°58'8.76" | E 23°42'54.45" | 12.Dec.2024 | T.A. Bellingan J. Zaayman | J.E. Bellingan A.J. Bellingan || 102192 || PARATYPE | Albanycada bellinganorum | Villet & Price"; AMGS.

Additional material examined. 4 ♂♂; 1 ♀. The metadata on the labels of these specimens are not cited verbatim. South Africa – **Eastern Cape** • 1 ♂; nr Willowmore; 32.969°S, 23.715°E; 31 Jan. 2006; T.A. Bellingan leg.; MHV0423; AMGS. • 2 ♂♂, 1 ♀; Rietfontein Farm; 32.969°S, 23.715°E; 19 Jan. 2008; B.W. Price & T.A. Bellingan leg.; MHV1035; AMGS. – **Western Cape** • 1 ♂; Calitzdorp; 33.500°S, 21.750°E; 24 Dec. 1989; H.C. Ficq leg.; SANC.

Morphological diagnosis. The external morphology and the male genitalia of *A. bellinganorum* Villet & Price, sp. nov. conform to the description of the genus (Figs 3C, D, 4). The primary feature distinguishing this species from *A. albigera* is the pigmentation pattern of its wings, especially the hind wing.

Morphological description. Male fore wing length 23.4–24.3; fore wing width 9.4–10.1; body length 19.8–20.7; head width 8.0–8.3; mesonotum width 8.3–8.6. Female fore wing length 22.5; fore wing width 8.8; body length 18.3; head width 6.8; mesonotum width 8.1.

Head with two black stripes running from eye to eye, one through the ocelli and the other across the bases of the antennae. Anteclypeus unmarked. Rostrum pale brown.

Pronotum anterior margin blackened. Pronotal incisures variably black. Mesonotum the medial obconical spots black, the lateral obconical spots black with chestnut centres, a narrow median line brown, and a pair of spots just anterior to cruciform elevation black. Fore wing with grey feathering along the veins in the distal half, distinct blackening of the subapical crossveins, and two submarginal rows of dark grey spots that straddle the veins, the proximal spots being larger but not touching; the proximal half is opaque, marbled to a variable degree with grey, brown and white with an ill-defined, blackish disco-basal band, 3rd and 4th ulnar cells usually with a distinct whitish patch towards apex; venation pale brown; setae black. Hind wing burnt orange basally (fading to yellowish-ochre in dead specimens), area around distal veins and crossveins

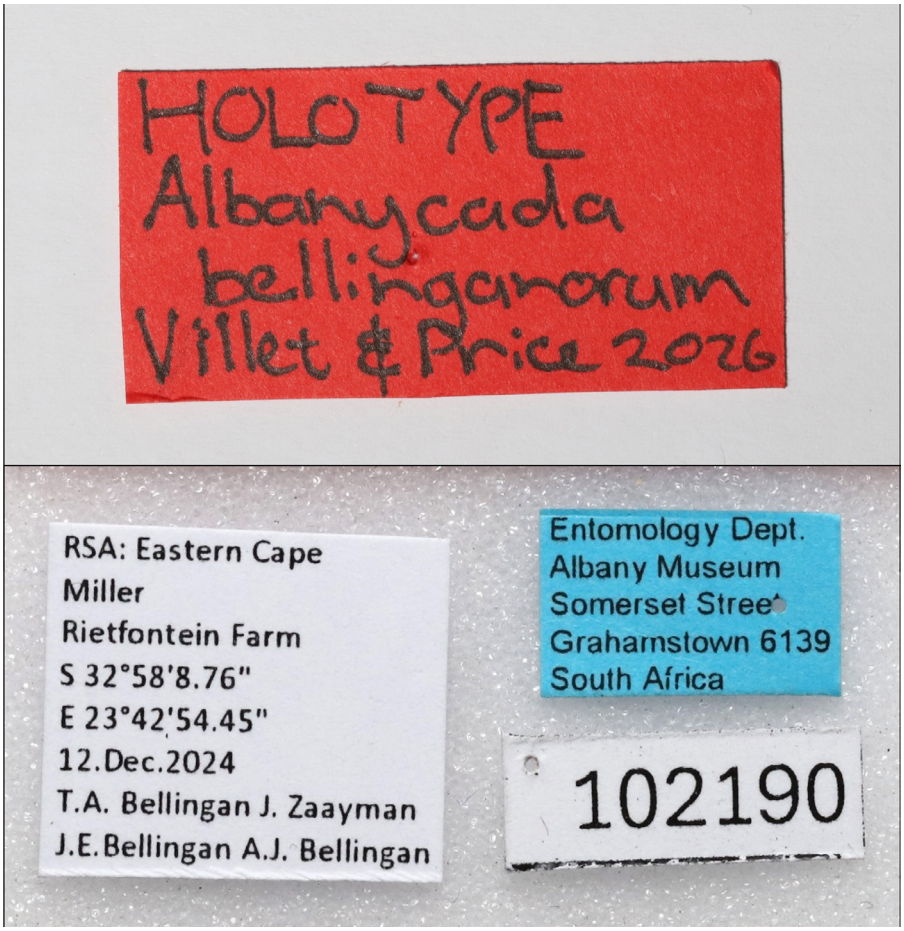

Figure 7. Labels of the holotype of *Albanycada bellinganorum* Villet & Price, sp. nov.

blackened, centres of apical cells hyaline; venation brown; crossveins not blackened; limbus crossed by evenly spaced black streaks hyaline; plaga greyish; jugum uniform. Legs brown; tibia often darker, with a dark brown patch near the proximal joint. Opercula dull brown.

Abdominal tergites very dark brown; the posterior margins pale. Timbal cover brown. Tergite 8 bearing tomentum. Sternites unmarked.

The sexes are similar in general appearance, colouration, body size and morphology, with the usual sexual dimorphisms of cicadas. Female opercula brown; tergite VII bearing tomentum; sternites unmarked; pygofer lacking ventral thorn, caudodorsal beak with apex sharply pointed; ovipositor sheaths reaching apex of caudodorsal beak; with 15 teeth.

Molecular systematics and phylogenetic history. Sequences from four genes (genseq-3 16S: FJ168837; genseq-3 COI: FJ169041; genseq-3 COII: GU344010; and genseq-3 EF-1*α*: GU343829) are available for identifying this species (Price et al. 2019), which is estimated to have diverged from *A. albigera* about 5 Ma at the end of the Miocene (Price et al. 2019).

Etymology. "Bellinganorum" is the Latin genitive neutral plural adjective indicating that this species is named in honour of the Bellingan family, who generously provided hospitality and assistance in obtaining specimens and sound recordings of *A. bellinganorum* Villet & Price, sp. nov. around their farm, Rietfontein.

Distribution, ecology and biology. South Africa: apparently endemic to Arid Thicket and Mosaic Thicket with Fynbos variants of the Albany Thicket Biome

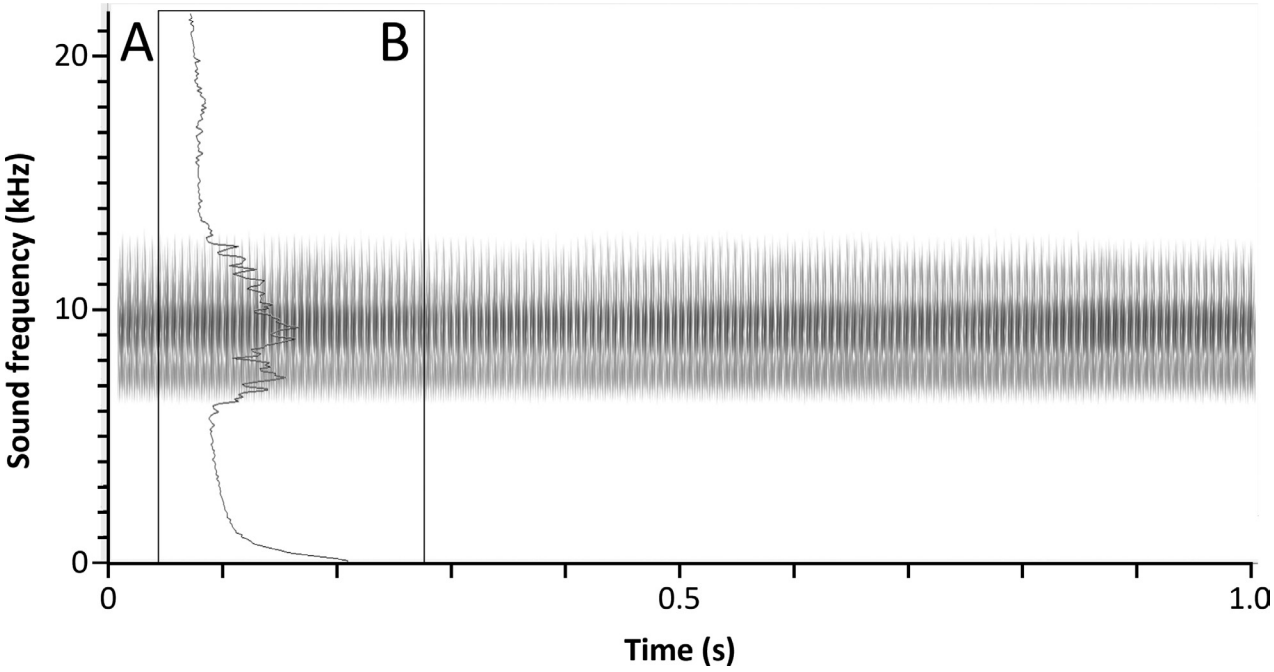

Figure 8. Calling song of *A. bellinganorum* Villet & Price, sp. nov. **A.** One-second-long sonogram; **B.** Power spectrum (superimposed in box).

of the westernmost Eastern Cape and eastern Western Cape, but the distribution is poorly sampled (Fig. 5).

The biology of this species is known only from observations made in a patch of Arid Thicket vegetation on the farm Rietfontein, near Willowmore (Fig. 5), in the Albany Thicket Biome (Hoare et al. 2006; South African National Biodiversity Institute 2021). Adults are associated with *Rhigozum obovatum* Burch. (Granaatbos / Yellow Pomegranate), a relatively widespread bush. The type locality has a population of the endemic *Aloe comptonii* Reynolds, which may be a marker plant for this variant of Arid Thicket (van Wyk and Smith 2001; Klopper and Smith 2011). Apart from its plant associations, this species' biology is probably similar to that of *A. albigera*.

Adults are known to be active in January.

Males do not form choruses. Like that of *A. albigera*, the calling song of *A. bellinganorum* Villet & Price, sp. nov. is a continuous, unmodulated whine that individual insects can sustain for long periods. It is pitched between 6.5–12.75 kHz, emphasized around 9.0 kHz, and with a pulse repetition rate of about 160 Hz (Fig. 8). The pulses are arranged in pairs in a manner similar to those in the calling songs of *A. albigera* and *Kongota punctigera* (Walker, 1850) (Villet 1989 figs 42–45). Recordings are available on the Bioacoustica website (https://bio.acousti.ca/sv/classification/albanycada-sp-01).

Conservation. Area of Occupation (AOO) 8 km^2; Extent of Occurrence (EOO) 0 km^2 (only two sites); altitudinal range 255–935 m. The species inhabits one of the smallest biomes in South Africa; the biome is resistant to many natural perturbations but not resilient to degradation (South African National Biodiversity Institute 2021), and ~50% of it is already transformed, although less so in the western parts (Carvalho et al. 2022). Although the known occurrences of *A. bellinganorum* are about 190 km apart, the intervening habitat is very elongated and very narrow (Fig. 5), so its true distribution merits investigation. The species'

IUCN status is Not Evaluated (NE); by criteria linked to its AOO and EOO and the characteristics of its habitat, it may well qualify as Critically Endangered (CR).

Relevant conservation measures are lacking (Carvalho et al. 2022) and the species is not yet known from any formally conserved area.

Discussion

While the species of *Albanycada* are not rare, they inhabit environments largely visited only by explorers and farmers, so specimens were very slow to accumulate in museums and there are no observation on iNaturalist yet. The collector of the holotype of *A. albigera* is unknown, but there is a second specimen in the Natural History Museum that is labelled "Delalande". Pierre-Antoine Delalande was employed by the Paris Museum of Natural History and, with his 12-year-old nephew, Jules Verreaux, collected 131 405 natural history specimens in South Africa in 1818–1820, sometimes accompanied by Ludwig Krebs (Plug 2024). Krebs sent the syntypes of *P. membranacea* to Berlin around 1822 (ffolliott and Liversidge 1971). Over a century later, the Albany, Iziko South African and Natural History Museums collectively received at least 25 specimens of *A. albigera* collected in 1926–1929 by Miss A. Walton, who lived on the farm Resolution, abutting the road between the Ecca Pass and Fort Brown (Plug 2021). Most of the specimens that inform our knowledge of *Albanycada* were collected for thesis work around 1993–2009.

The two species of *Albanycada* are associated with the Albany Thicket Biome (Hoare et al. 2006; South African National Biodiversity Institute 2021). The distribution of *A. albigera* is focused on what botanists term the Albany Centre of Floristic Endemism, while *A. bellinganorum* Villet & Price, sp. nov. might be associated with the Little Karoo Centre of Floristic Endemism (van Wyk and Smith 2001). The Albany Centre lies across the catchments of the Kei, Great Fish and Sundays Rivers. Other South African cicadas with catchment-bounded distributions occur in the genus *Platypleura*, but these cases also involve host-plant-specificity (Price et al. 2010), which is not the case in *Albanycada*. It is not clear what ecological variables link *Albanycada* to the Albany Thicket Biome.

It has been argued that the Albany Thicket Biome originated as early as the Eocene (Cowling et al. 2005), although the subtypes currently occurring in South Africa are more recent. It is therefore reasonable that the *Albanycada* lineage colonized the biome in the Miocene and has remained endemic to it. *Albanycada albigera* inhabits most subtypes of Albany Thicket (except Dune Thicket, apparently), while *A. bellinganorum* Villet & Price, sp. nov. is apparently distributed in the western Arid Thicket and Mosaic Thicket with Fynbos subtypes. The distribution of the biome has apparently been responsive to past glacial cycles (Potts et al. 2013), which suggests that recurring climate-driven cycles of allopatry caused the diversification of *Albanycada*, but the cycles began 2.58–2.6 million years ago and the two species diverged earlier, at the start of the Pliocene about 5 Ma (Price et al. 2019).

The future of the *Albanycada* lineage seems equivocal due to the declining extent of its habitat (South African National Biodiversity Institute 2021; Carvalho et al. 2022). The Albany Thicket Biome is a highly productive vegetation type that covers a substantial part of the southern mesic and semiarid parts of South Africa, and it is highly resistant to a wide variety of disturbances such as fires and some forms of herbivory (Stuart-Hill 1992). Paradoxically, its productivity has led to intense land use leading to habitat fragmentation (Robertson

and Palmer 2002), and its plants lack the regenerative characteristics that would let it return to its original stable state. Estimates of 20–99% of the area of various subtypes are already transformed and substantial on-going losses of about 40% of extent of the biome occurred between 2006 and 2018 (Skowno and Monyeki 2021; Carvalho et al. 2022). Currently, 38 of the biome's 44 subtypes are classified as of Least Concern, collectively retaining 80% of their extent (Skowno and Monyeki 2021). The biome has apparently responded to past climate changes (Potts et al. 2013) and it is estimated that nearly 20% of its current extent may become climatically unsuitable under a coupled ocean-atmosphere model of climatic change (Robertson and Palmer 2002).

We recommend that a conservation status analysis (Cardoso et al. 2016; IUCN Standards and Petitions Committee 2019) be done for the members of this genus, and particularly for *A. bellinganorum* Villet & Price, sp. nov.

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Additional information

Conflict of interest

The authors have declared that no competing interests exist.

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Artificial Intelligence (AI) use

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Author contributions

MHV conceptualised the project, provided financial administration, conducted analyses, wrote and illustrated the draft, reviewed and edited the revised draft, and approved the final submission; TAB conducted field work, provided photographs, acoustic recordings and ecological notes, reviewed and edited the revised draft, and approved the final submission. BWP conceptualised the project, provided photographs, acoustic recordings and ecological notes, reviewed and edited the draft, and approved the final submission.

Author ORCIDs

M.H. Villet https://orcid.org/0000-0002-4335-5667
T.A. Bellingan https://orcid.org/0000-0002-3064-1744
B.W. Price https://orcid.org/0000-0001-5497-4087

Data availability

The type series of A. bellinganorum Villet & Price, sp. nov. is deposited in the Albany Museum, Makhanda, and digital recordings of its calling song are available on the Bioacoustica website (http:||bio.acousti.ca/classification/albanycada). Other data are available in the text.

Supplementary material 1

Linked data table template for primary biodiversity data - *Albanycada*

Authors: Martin H. Villet, Terence A. Bellingan, Benjamin W. Price
Data type: xlsx
Copyright notice: This dataset is made available under the Open Database License (http://opendatacommons.org/licenses/odbl/1.0/). The Open Database License (ODbL) is a license agreement intended to allow users to freely share, modify, and use this Dataset while maintaining this same freedom for others, provided that the original source and author(s) are credited.
Link: https://doi.org/10.3897/AfrInvertebr.67.208987.suppl1