

Systematic status of *Platypleura stridula* L. and *Platypleura capensis* L. (Homoptera, Cicadidae)

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Although synonymized for many decades, the Linnaean species *Platypleura stridula* and *P. capensis* are biologically distinct, differing in their host plant and habitat preferences, geographical distribution and calling songs. There are also morphological differences between the two taxa which parallel the differences in their biology. *P. capensis* should therefore be accorded specific rank.

Ten spyte daarvan dat hulle vir dekades al as sinoniem beskou word, verskil *Platypleura stridula* en *P. capensis* biologies wat betref gasheerplante en habitatvoorkeur, goeografiese verspreiding en roepstemme. Verskille in morfologie word ook tussen die twee taxa aangetref wat die biologiese verskille weerspieël. Spesiestatus behoort dus aan *P. capensis* toegeken te word.

Amongst the earliest accepted names in cicada taxonomy is that of the Linnaean species, *Cicada stridula* (Linne, 1758). Six years after its first description, Linnaeus redescribed the species, along with a new species, *Cicada capensis* (Linnaeus, 1764). The two taxa were synonymized by Fabricius (1794), and Blanchard (1840) subsequently designated *capensis* as a variety of *stridula*. Although Stal (1866) supported this decision, Butler (1874) resurrected the taxon *capensis* as a distinct species. In his synonymic catalogue of the cicadas of the world, Distant (1906) retained the synonymy, and this taxonomic arrangement has persisted to the present day (Metcalf 1963; Boulard 1972; Duffels & van der Laan 1985).

Amyot & Serville (1843) made *stridula* the type species of their genus, *Platypleura*. Seventy years later, this group was split into nine genera (Distant 1904). The African species remaining in *Platypleura* after this revision were divided into nine further genera by Boulard (1972), who confirmed *stridula* as the type species of *Platypleura*, and retained the name *Platypleura stridula* var. *capensis* for the other taxon (Boulard 1972). *P. stridula* is also the type species of the subfamily Platycleurinae (Schmidt 1919). This group originally held the genera *Oxypleura*, *Poecilopsaltria* and *Pycna* and the nine genera which Distant erected from *Platypleura*. In order to resolve the taxonomic status of *P. capensis*, a study of the morphology and biology of the two taxa was undertaken.

Methods

Specimens were collected from many localities during December 1985, January 1986 and January 1987. At the same time, the habitats and host-plant preferences of the insects were noted. Tape recordings of males' calling songs were made on high quality Scotch standard play magnetic tape, at a speed of 38 cm/s, using a Nagra III tape recorder and a Bayer M69N dynamic microphone. Sonagrams were made from these recordings using a Kay model 7029A Sonagraph sound spectrum analyser. The amplitude of the song input was standardized using the analyser's VU meter.

Additional locality records were gleaned from specimens in the Transvaal Museum, Pretoria, the South African Museum, Cape Town, and the National Collection of Insects, Pretoria.

Results

Markings

The markings (Figure 1) on the tegmina of *P. stridula* are poorly differentiated and extend over the entire surface of the tegmen, except for the membrane beyond the distal crossveins. The marginal cells of the hind wings are infused with the dark grey colouration of the veins, and the basal portion of the wing is a brownish orange colour. The tegminal markings of *P. capensis* are more variable in their intensity, and generally include fenestrae or clear areas in the marginal cells. The dark markings on the hind wing are usually blacker than in *P. stridula*, and the central areas of the marginal cells are often clear. The basal half of the hind wing varies in colour from a bright orange in some specimens to almost

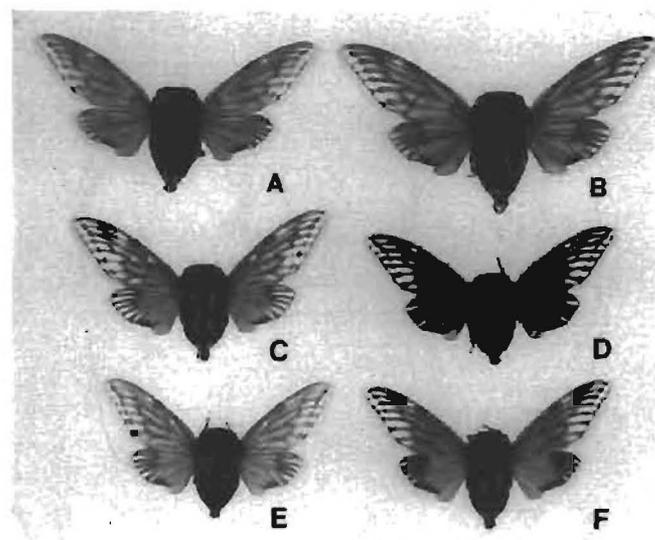


Figure 1 *Platypleura* imagoes: A, B, *P. stridula*; C-F, *P. capensis*.

peachy in others. It rarely has the brownish tone seen in *P. stridula*.

The central black pronotal stripe tends to be tapered and triangular in *P. stridula*, but narrower and parallel-sided in *P. capensis*. The mesothoracic markings are variable in both taxa. No consistent differences were found in the markings on other parts of the body.

Size

Specimens of *P. capensis* are generally smaller than those of *P. stridula* (Table 1). This was quantified by measuring the base-to-apex length of the tegmen, and comparing the mean values of each sex between species using a Student's *t* test. The results were statistically significant for both sexes ($p < 0,0001$).

Male genitalia

The pygophore (Figure 2a) of *P. stridula* is oblong, with broad, slightly cupped pygophoral processes. The tips of the ventro-medial processes of the urite of anal segment are rounded and armed with spines like those on the lateral processes. The lateral processes curve inward.

In comparison, *P. capensis* has a smaller, more tapered pygophore. The recurved portions of the ventro-medial processes of the urite are more slender, and characteristically bear short hairs, with perhaps one or two poorly developed spines only. The lateral processes do not curve inward as much as in *P. stridula*.

Table 1 Base-to-apex lengths (in mm) of the forewings of *Platypleura stridula* and *P. capensis*

Sex	<i>P. stridula</i>		<i>P. capensis</i>		<i>t</i> *	<i>p</i> (<i>t</i>) *
	<i>n</i>	mean	range	range		
Male	16	30,2	29,3–32,8	24 26,5 24,8–29,2	-10,89	0,0001
Female	5	31,0	29,9–32,2	9 26,8 25,3–28,7	-8,11	0,0001

* Student's *t* test.

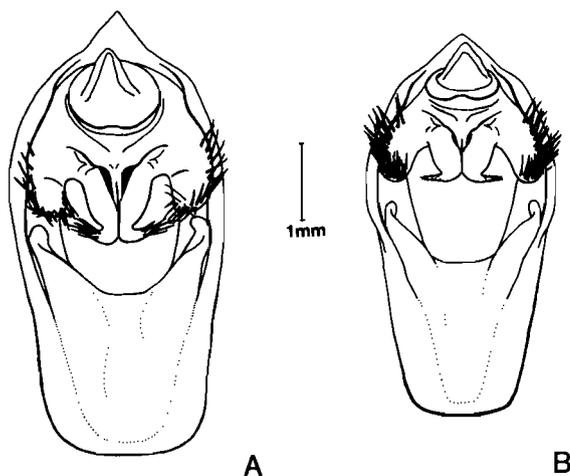


Figure 2 Male genitalia (pygophore and urite). A, *P. stridula*; B, *P. capensis*.

Nymphs

The exuviae of nymphs of both taxa (Figure 3) were found attached to plants near choruses of the adults. Those of *P. stridula* are larger than those of *P. capensis*, with relatively smaller eyes and more strongly sclerotized femoral spines on the forelegs. The femoral spines differ little in shape between the taxa, and the same number are present in each. The clypeus of *P. stridula* nymphs is acute, with a pointed profile, while in *P. capensis* it is bulbous and rounded. The abdomen of *P. stridula* is curved downwards and has a distinct waist when viewed dorsally. By comparison, *P. capensis* has a relatively straight, cylindrical abdomen which curves only slightly, and which does not have a distinct waist.

Biology

Calling songs

The calling songs of the two taxa are illustrated in Figure 4. The calling song of *Platypleura stridula* is a continuous, piercing, pulsatile noise which is emitted for several minutes at a time. Its frequency range is 5 – 10 kHz, emphasized at 7,5 kHz. There are about 19 pulse groups per second, each group 50 ms long.

P. capensis has a more complicated song, composed of two repeatedly alternated motifs pitched between 8 – 15 kHz, emphasized around 11 kHz. Motif A is a continuous, pulsatile sound some 4 s long, composed of about 22 pulse groups per second. The groups are 40 ms long, separated by 5 ms. Motif B contains twice as many pulse groups, which create a continuous sound. It lasts about 4 s. The end of each motif merges into the start of the other, so that calling may continue uninterrupted for

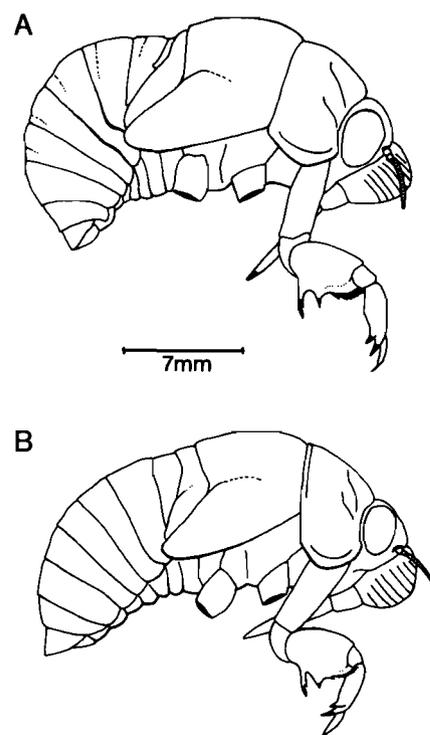


Figure 3 Profiles of final instar nymphal exuviae. A, *P. stridula*; B, *P. capensis*.

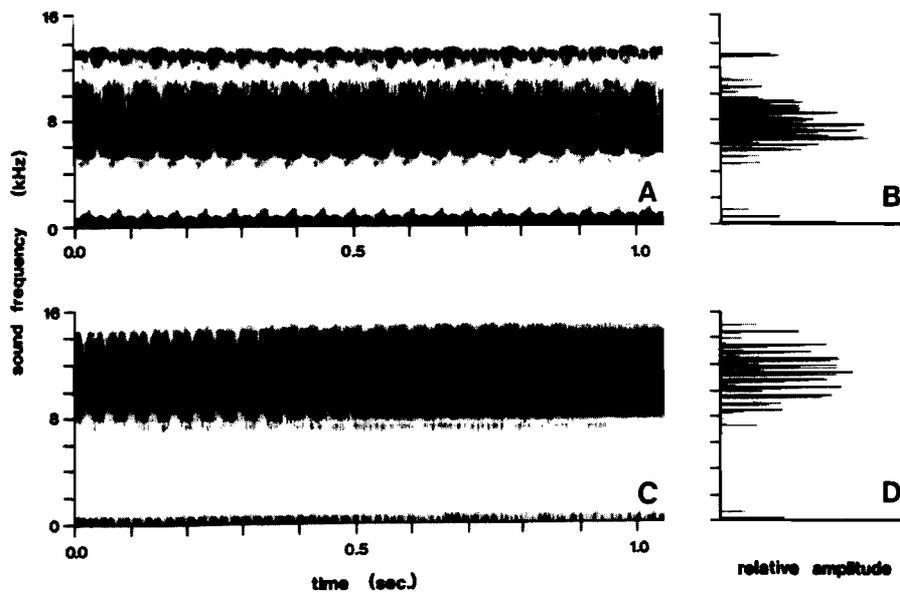


Figure 4 Calling songs: A, B, *Platyleura stridula*; C, D, *Platyleura capensis*. A, sonogram; B, D, power spectrum; C, sonogram showing motif A running into motif B.

many minutes. Both motifs are composed of harmonics of 500 Hz, but those in motif A are more broadly tuned.

Host plants

Adult *P. stridula* was recorded feeding on plane trees (*Platanus x hispanica*), weeping willow (*Salix babylonica*) and grape vines. Specimens were seen perching mainly on trees, all of which were exotics, e.g. Port Jackson willow (*Acacia saligna*), oak (*Quercus robur*), and an unidentified gum (*Eucalyptus* sp.). On the other hand, *P. capensis* adults perched only on various indigenous, shrubby heaths and ericas (family Ericaceae), on which it probably feeds, although this was not directly confirmed. It was never seen in trees. The species thus differ not only in preferring different growth forms, i.e. either trees or shrubs, but also in their degree of specificity for particular plant taxa.

No reliable data on nymphal host plants were gathered.

Preferred habitats

Because of its preference for trees rather than other plant growth forms, *P. stridula* was generally found in plantations, wooded areas along drainage lines or in gardens. *P. capensis* was found in various habitats e.g. roadsides, beaches and heaths, where its ericoid hosts grew. These plants rarely grow amongst trees, and this cicada was absent from wooded habitats.

Geographical distributions

The range of *P. capensis* extends from Cape Point north to Langebaan, and east to Port Alfred. This area (Figure 5b) coincides with the extent of the fynbos or ericoid floral kingdom (Acocks 1975). *P. stridula* is confined to regions within about 200 km of False Bay (Figure 5a), but the reason for this is unclear.

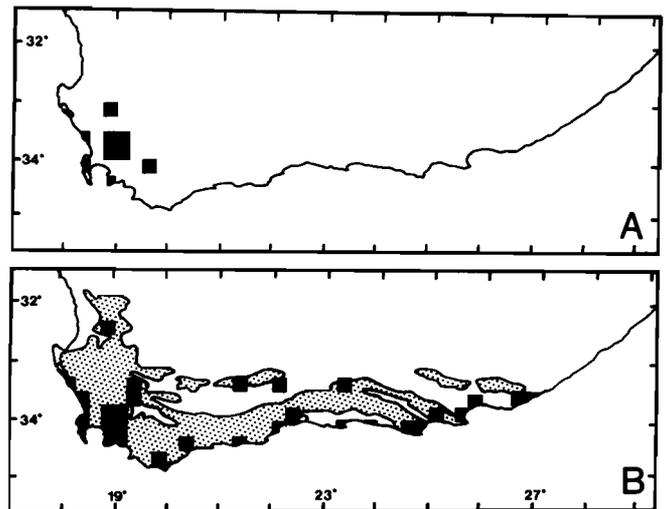


Figure 5 Geographical ranges: A, *P. stridula*; B, *P. capensis*. The stippled area represents the extent of ericoid habitats (taken from Acocks 1975).

Discussion

Platyleura stridula and *P. capensis* display differences in morphology which parallel differences in their biologies. In particular, the differences in their songs qualify them as distinct species, and *P. capensis* should therefore be recognized as a distinct taxonomic species, as Linnaeus originally proposed.

A synonymic list for both taxa was given by Metcalf (1963) and updated by Duffels & van der Laan (1985). *P. stridula* was correctly illustrated by Boulard (1972) in his revision of the genus *Platyleura*. However, Boulard (1975) has also illustrated *P. capensis* under the name of *P. stridula*, without citing the specimen as belonging to the taxon *capensis* (Boulard 1975). In his *Insecta Transvaalensia*, Distant (1907) illustrated a cicada which

he referred to as *P. stridula* var. *capensis*, but which is actually a specimen of *P. hirta* Karsch with pale, indistinct markings. It is therefore probable that the localities which he cites for this species (Natal and Transvaal) are in error, along with those of many other authors (Metcalf 1963), including Linnaeus's original locality for *P. stridula*: India.

Boulard (1975) has described and illustrated another species, *P. turneri*, which he stated is allied to *P. capensis*. The type locality of the single female specimen is Ceres (33°20'S / 19°18'E), South Africa. The three may be distinguished by the following key.

1. Tegmina without clear areas; hind wings insipidly coloured..... *P. stridula*
- Tegmen with clear-centred radial cells; hind wings strongly coloured 2.
2. Jugum of hind wing blackened distally; tegmen with silvery sheen *P. turneri*
- Jugum of hind wing not blackened distally; tegmen not silvery..... *P. capensis*

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