

A new *Hilda* species (Hemiptera, Fulgoromorpha, Tettigometridae) on *Protea* sp. (Proteaceae) from KwaZulu-Natal, South Africa

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With 6 figures

Abstract

A new Tettigometridae species *Hilda (Prodhilda) proteacola* sp.n. is described from KwaZulu-Natal, South Africa. This new species feeds on various species of *Protea* (Proteaceae) and is tended by several species of ants.

Key words: *Hilda (Prodhilda) proteacola* sp.n., ant-attending, Natal-Drakensberg.

Introduction

Within the scope of the revision of the African Tettigometridae (Bourgoïn 1986, 1987, 1988, 1993), we describe here a new *Hilda* species which falls in a recently described subgenus, *Prodhilda* Bourgoïn, 1988. This subgenus was erected to receive the *hildine* species *Hilda (Prodhilda) hodeberti* Bourgoïn, 1988, which differ from the nominal subgenus by its long labium and its higher metatibiotarsal formula.

In this subgenus, both species are currently only known from KwaZulu-Natal (KZN), South Africa, and as most other *tettigometrid* species, they are attended by ants (Dejean et al. 1997a, 1997b, 1998, in press; Bourgoïn 1997a, b). Some etho-ecological observations are also reported for this new species, which appears to feed only on different species of a single genus, *Protea* (Proteaceae).

Taxonomy

Hildinae Fennah, 1952: 240

Hilda Kirkaldy, 1900: 243

Prodhilda Bourgoïn, 1988: 33

Hilda (Prodhilda) proteacola sp.n.

Figs 1–5

Head capsule narrower than pronotum. Vertex between the eyes wider than long medially, somewhat bulging laterally. Anterior margin of vertex bounded by a single carina. Subocular callus not surpassing lateral margin of the compound eyes in dorsal view. Posterior margin of compound eyes and head capsule parallel. In lateral view, frontal area strongly concave, then convex at the postclypeus level. Genomaxillar carina projecting strongly under the antenna up to Evans organ. Labium reaching metacoxae with apical segment longer than the subapical one. Antenna with pedicel surpassing the antero-external margin of the compound eyes in dorsal view. Pedicel 2.5 times longer than scape with its apical extension above the flagellum insertion well developed and equal a quarter of the pedicel length.

Pronotum lateral margin the between tegulae and head capsule wider than length of tegulae: compound eyes not reaching tegulae posteriorly. Length of mesonotum + scutellum medially slightly longer than length of vertex + pronotum. Scutellum and mesonotum separated by a transverse groove. Prothoracic femora surpassing laterally the costal margin of the tegminae. Tegmi-

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nae with a typical *hildine* pattern covered with dark spots. Metatibiotarsal formula: 9-11/8-10/2.

General coloration dark brown to very dark which masks the *hildine* pattern of the tegminae (Fig. 5). Frons with dorsal margin brown, followed by wide black band between compound eyes and a creamish band between the antennae; clypeus orange-brown, darker ventrally and laterally. Apex of labium dark. On paler specimens, mesonotum dark-orange-brown with a velvet-like appearance; tegminae with the numerous dark brown spots well visible. Long dark setae present on the dorsal part of the body and on the tegminae.

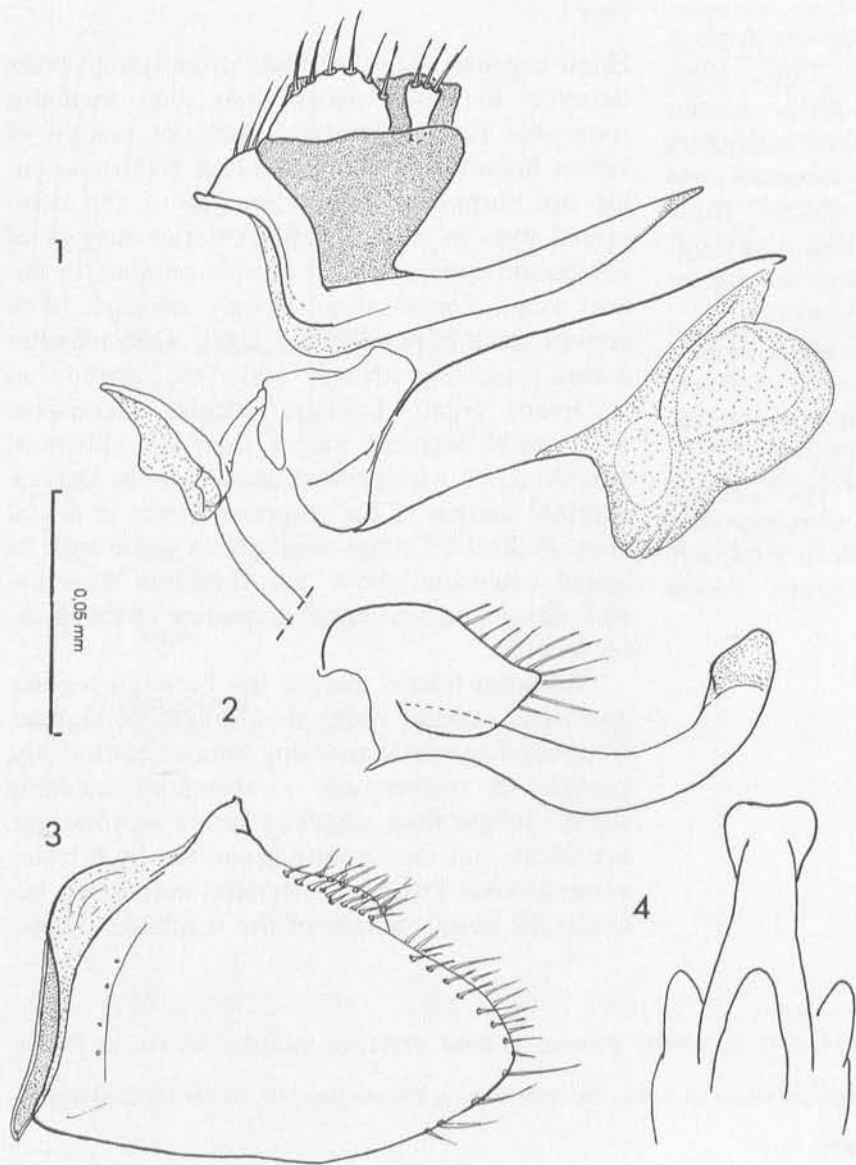
Total length male: 5.3-5.6 mm; total length female: 5.9-6.2 mm.

Male genitalia: of typical *hildine* pattern (Fig. 1). Subanal process a little shorter than aedeagus. Sclerotized ring of tenth segment narrow in

lateral view. Aedeagus stout, in lateral view with a virtual basal notch; membranous endosoma well developed. Lamina gonostyli sclerotized, strong, upcurved in its apical third (Fig. 2); in posteroventral view narrowed subapically (Fig. 4). Gonostyli lobes well-developed but short, apically acute and bearing long, clear setae (Fig. 2). Pygofer longer than high in lateral view, strongly convex postero-dorsally (Fig. 3).

Female genitalia: of typical *hildine* pattern. Ovi-valvula not separated from the seventh sternal plate, but clearly delimited by an uncoloured membranous line in dissected specimens and at least by strong lateral folds in dry specimens.

Type material. Holotype ♂, South Africa: Natal, Drakensberg, Cathedral Peak area, Tarn Hill, 1710 m, on *Protea caffra*, on young shoot, Pajor I., 15. X. 1989, 94d/1, deposited in Muséum national d'Histoire naturelle, Paris (MNHN).



Figs 1-4. *Hilda (Prodhilda) proteacola* sp.n. - 1. male genitalia and anal tube, left side; 2. lamina gonostyli, left side; 3. pygofer, left side; 4. lamina gonostyli, ventral view

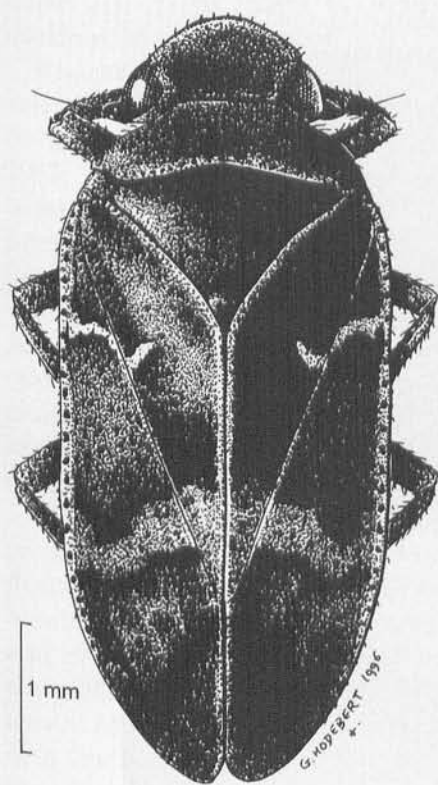
Paratypes: total 32 specimens: 19 specimens (11 ♂♂, 8 ♀♀) deposited in Natal Museum (NMSA), Pietermaritzburg. All specimens from NATAL (KZN) Drakensberg, Cathedral Peak area, leg. Pajor I. 1 ♂, 118b/1, on *Protea dracomontana*, on new shoot, firebreak 'C XIV-C XV', 1950 m, 10. III. 1991; 1 ♂, 126/5, within pre-excavated receptacle of *Protea roupelliae* fruit head, Tarn Hill, 1720 m, 28. V. 1990; 1 ♂, 136a/3, on *Protea roupelliae*, leaf, Tarn Hill, 1710 m, 20. II. 1990; 1 ♂, 136b/7, on *Protea roupelliae*, twig, Tarn Hill, 1710 m, 15. VI. 1990; 1 ♂, 131c/1, on *Protea roupelliae*, leaf, Tarn Hill, 1710 m, 19. II. 1989, tended by *Myrmecaria* sp.; 1 ♂, 131d/7, on *Protea roupelliae*, twig, Tarn Hill, 1710 m, 17. X. 1989, tended by *Myrmecaria* sp.; 1 ♂, 128b/2, on *Protea caffra*, shoot, Tarn Hill, 1860 m, 14. IV. 1990, tended by *Myrmecaria* sp.; 1 ♂, 73a/1 and 1 ♀, 73a/5, on *Protea caffra*, below old inflorescence, Tarn Hill, 1720 m, 29. III. 1989, tended by *Myrmecaria* sp.; 1 ♂, 156a/1, on *Protea caffra*, fresh shoot, Tarn Hill, 1560 m, 20. XI. 1989, tended by *Anoplolepis custodiens*; 1 ♂, 135c/1, on *Protea caffra*, leaf, Tarn Hill, 1720 m, 23. IV. 1990, tended by *Myrmecaria* sp.; 1 ♂, 150a/1, on *P. caffra*, flower bud, Tarn Hill, 1575 m, 10. II. 1989, tended by *Anoplolepis* sp.; 1 ♀, 66b/3, on *Protea caffra*, young flower bud, Tarn Hill, 1550 m, 24. XI. 1988; 1 ♀, 77/1, on *Pro-*

tea caffra, Tarn Hill, 1550 m, 10. XI. 1988; 1 ♀, 154a/1, on *Protea caffra*, young shoot, Tarn Hill, 1560 m, 23. XI. 1988, tended by *Anoplolepis custodiens*; 1 ♀, 136c/2, on base of *Protea caffra* fruit head, 1710 m, 19. II. 1990; 1 ♀, 118b/3, on base of *Protea dracomontana* new shoot, fire break 'C XIV-C XV', 1950 m, 10. III. 1991, tended by *Myrmecaria* sp.; 1 ♀, 120/7, on base of *Protea caffra* leaf, in *Paurocephala* sp. gall, Tryme Hill, 1580 m, 11. IV. 1991.

13 specimens (5 ♂♂, 8 ♀♀) deposited in MNHN. All specimens from South Africa, KZN Drakensberg, Cathedral Peak area, leg. I. Pajor. 1 ♂, 3 ♀♀, 118b/1, on *Protea dracomontana*, on young shoot, fire break 'C XIV-C XV', 1940 m, 9. XI. 1990, tended by *Myrmecaria* sp.; 1 ♀, 126/23, on *Protea roupelliae*, in pre-excavated receptacle of empty fruit head, Tarn Hill, 1720 m, 28. V. 1990, tended by *Myrmecaria* sp.; 1 ♀, 136d/4, on *Protea roupelliae*, on young shoot, Tarn Hill, 1720 m, 26. I. 1990, tended by *Myrmecaria* sp.; 1 ♀, 140/6, on *Protea caffra*, on twig, Tarn Hill, 1850 m, 17. II. 1990, tended by *Myrmecaria* sp.; 1 ♂, 136c/3, on *Protea caffra*, on base of fruit head (infructescence), Tarn Hill, 1710 m, 19. II. 1990, tended by *Myrmecaria* sp.; 2 ♂♂, 1 ♀, 98/2, on *Protea caffra*, on base of flower bud, Tarn Hill, 1570 m, 9. XI. 1990, tended by *Anoplolepis* sp.; 1 ♀, 86h/2, on *Protea caffra*, on stem, Tarn Hill, 1720 m, 30. VI. 1989; 1 ♂, 73a/2, on *Protea caffra*, on branch, Tarn Hill, 1720 m, 30. III. 1989.

Other material examined. In NMSA: 1 ♀, 8 nymphs same data as holotype. 1 ♀, 151a/1, tended by *Pheidole* sp. (Myrmecinae) just below fruit head on *Protea caffra*, on twig, Mike's Pass-Ndumeni valley, Cathedral Peak area, 1550 m, 7. V. 1990; 1 nymph, 120/8, on *Protea caffra*, on leaf, in gall caused by *Paurocephala* sp. (Aphalaridae, Psylloidea), Tryme Hill, 1580 m, 11. IV. 1991, tended by *Pheidole* sp.; 3 nymphs, Tarn Hill: 154/2, 1565 m, on *Protea caffra*, new shoot, 27. IX. 1989, tended by *Anoplolepis custodiens*; 4 nymphs, Tarn Hill: 136e/7, on *Protea roupelliae*, young shoot, 1720 m, 13. III. 1990-150a/2, on *Protea caffra*, base of flower bud, 1575 m, 10. XII. 1989, tended by *Anoplolepis custodiens* - 137a/2, on *Protea caffra*, lower side of flower bud, 1840 m, 20. IX. 1989, tended by *Crematogaster* sp. 'A' - 94d/2, on *Protea caffra*, young shoot, 1710 m, 15. X. 1989, tended by *Myrmecaria* sp.

In MNHN: 1 ♂, 12 nymphs, in MNHN. 3 nymphs: 92c/3, on *Protea caffra*, on young vegetative bud,



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Fig. 5. *Hilda (Prodhilda) proteacola* sp.n., habitus

Tarn Hill, 1720 m, 23. IX. 1989, tended by *Myrmicaria* sp.; 2 nymphs: 94d/2, on *Protea caffra*, on young shoot, 1710 m, 15. X. 1989, tended by *Myrmicaria* sp.; 5 nymphs: 131d/8, on *Protea roupelliae*, on very young leaves, 1720 m, 16. X. 1989, tended by *Myrmicaria* sp.; 1 nymph, 137a/2, on *Protea caffra*, on flower bud, Tarn Hill, 1840 m, 17. II. 1990, tended by *Crematogaster* sp. 'A'; 1 ♂, 1 nymph, Tryme Hill, 120/8, on *Protea caffra*, on leaf, in gall caused by *Paurocephala* sp. (Aphalaridae, Psylloidea), Tryme Hill, 1580 m, 11. IV. 1991, tended by *Pheidole* sp.

Remarks

Hilda (Prodhilda) proteacola sp. n. agrees with the characters listed for the subgenus *Prodhilda* Bourgoin, 1988, which was established for another Natal species *H. (Prodhilda) hodeberti* Bourgoin, 1988. These two species allow to define more precisely some new characters of probably autapomorphic value for this subgenus: a head capsule wider than long, a long labium reaching the metacoxae, a pygofer with a strong convexe postero-dorsal margin, an aedeagus with a virtual basal notch and a different metatibiotarsal formula: 9–11/9–10/2 versus 7–8/7–8/2 in

the other species of the genus. It is probable that after complete revision of the genus *Hilda* this subgenus may be given full generic status.

Distribution, ecology and behaviour

All localities for this new species are in the Cathedral Peak area (28°57' S, 12°12' E), KZN Drakensberg, at altitudes between 1480–1950 m above sea level (Pajor & Samways 1994), which are the highest altitudes ever recorded for *tettigometrids*. This area lies in the central region of the Drakensberg mountains along the eastern escarpment of South Africa. It falls within the 'Afromontane region' according to White's (1978) phytogeographical classification and the 'Protea Savanna' of the Montane Belt (for both *Protea caffra* and *Protea roupelliae*) and within the 'Subalpine Fynbos' of the subalpine Belt (Killick 1990) (for *Protea dracomontana*). This region has a warm, temperate climate and receives between 1200–1400 mm of annual precipitation, of which about 70 ♂♂ falls during the summer months, October to March (Everson et al. 1988).

The host-plant genus *Protea* (Dicotyledoneae, Rosidae, Proteaceae) is endemic to sub-Saharan Africa (Rourke 1980). To date, the following

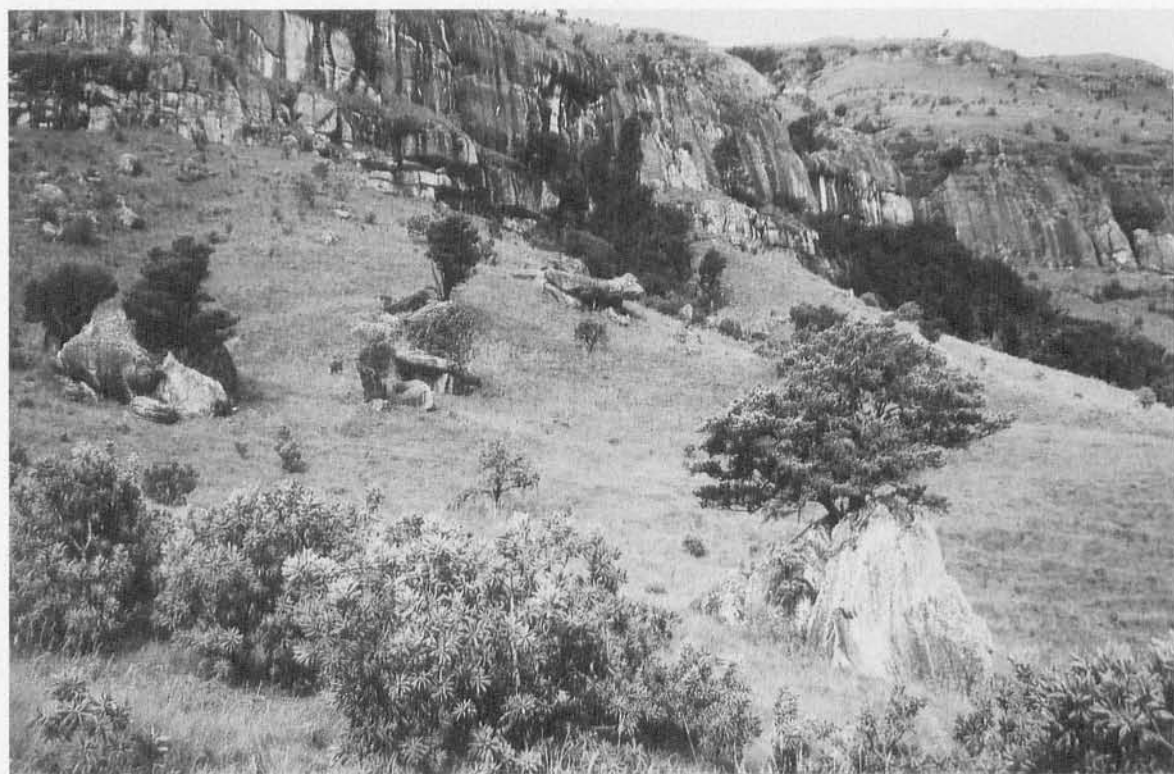


Fig. 6. Typical habitat of *Hilda (Prodhilda) proteacola* sp.n. "Protea Savanna" in the Drakensberg

three species have been observed to support populations of *H. (Prodhilda) proteacola*: *Protea caffra* Meisn. subsp. *caffra* Chisumpa & Brummitt, *Protea dracomontana* Beard and *Protea roupelliae* Meisn. subsp. *roupelliae*. This degree of host plant specialization by this *hildine* species appears to be high, as it seems to be restricted to plant species from the same genus. Following Wilson et al. (1994) *H. (Prodhilda) proteacola* can be placed within the group of monophagous species feeding on Dicotyledoneae, Rosidae, as most Tettigometridae: 63% are monophagous, 76% are found on Dicotyledoneae and within this last group almost 50% feed on Rosidae (Bourgoin 1997a). This new species represents the second record of a *tettigometrid* feeding on Proteaceae after *Hilda patruelis* which has been collected from two other species of *Protea*: *P. angolensis* and *P. gagedi* (Weaving 1980, re-cited by Annecke & Moran 1982). However, no voucher specimens were kept of that earlier study to confirm the identity of this second *hildine* species which, in any cases, is a highly polyphagous species.

Hilda proteacola shows a more restricted distribution than its host plants. Indeed, it is limited to altitudes between 1500 m and 1750 m, while *P. caffra* and *P. roupelliae* show a distribution from sea level to 2400 m of altitude (Chisumpa & Brummitt 1987, Rourke 1980, Rebelo 1995). Climatic constraints might be a key factor in the distribution of this species.

Rourke (1980) and Rebelo (1995) have considered a much broader *Protea* species concept by inclusion of *Protea injangensis* Beard (Beard 1963, 1992) from the Eastern mountains of Zimbabwe, into *P. dracomontana*. According to this interpretation this last species survives in a disjunct habitat. It would be interesting to check whether *H. (Prodhilda) proteacola* follows the same pattern of distribution, and if so, if the climatic constraints appear to be similar. Unfortunately, at present there is no ecological data known for the other *Prodhilda* species for more comparative studies.

Hilda (Prodhilda) proteacola prefers fresh, growing plant tissue (Pajor 1996). Eggs are deposited mostly onto the outermost involucre bracts of unopened inflorescences and the apical end of the adjoining flowering branches (Pretorius 1986). Occasionally it also oviposited on leaves of growing young vegetative shoots, and in a few cases into cracks in the bark of older branches. On *P. roupelliae*, eggs were laid exclusively on young leaves. Eggs batches on *P. caffra*

usually contained 35–50 eggs (range: 16–200), while the mean number of eggs per batch was 12–15 on *P. roupelliae*. Egg numbers were also very low on *P. dracomontana* (less than one dozen). Two to four generations per year were observed.

Hilda (Prodhilda) proteacola is tended by various species of ants through all of their life stage. The most common ant species was *Myrmecaria* sp. (Myrmecinae) followed by *Anoplolepis custodiens* (Formicinae). Two other *myrmecine* genera *Crematogaster* sp. and *Pheidole* sp. were only infrequently encountered in association with the *tettigometrid*. All these ants species are often observed with various species of this family (Bourgoin 1997a). This pattern is not *tettigometrid* specific but appears to be general for sap-sucking Hemiptera (Hölldobler & Wilson 1988).

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