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Three new species of South African stick insects (Phasmida)

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Abstract

Three new species from the Western Cape of South Africa are described and figured: *Clonaria cederbergensis*, *Clonaria montana* (Diapheromeridae: Pachymorphinae: Gratidiini) and *Macynia mcgregororum* (Bacillidae: Macyniinae: Macyniini). The first two species have close associations with the Cederberg Wilderness Area and Table Mountain, respectively. *M. mcgregororum* has been found near Citrusdal. Keys are provided.

Key words

Clonaria, *Macynia*, new species, South Africa, Western Cape

Introduction

As part of a detailed on-going study on South African stick insects, this paper describes two new species found on a collecting trip to the Western Cape in October 2005, and a further species present in the South African Museum, Cape Town collection. The classification used follows Otte & Brock (2005) and the Phasmida Species File Online.

During brief earlier visits to Cape Town (1998, 2000), I found undescribed material of three species from Western Cape in the South African Museum (SAMC) collection. In order to study these in detail, I decided to try to locate living material, and to obtain permits from the relevant authorities for both dead and living specimens. Accommodation was provisionally arranged at Western Cape localities in late October 2005, taking into account the known range of species and comments from entomologists. At night I collected using torchlight, by systematically searching vegetation, particularly natural vegetation (fynbos); in the daytime, a beating tray was used: both methods were successful. At 'The Baths', Citrusdal, a daytime find led me to locate several more insects by searching at night in the same location.

Taxonomy

Abbreviations for Depositories.—

BMNH Natural History Museum, London, United Kingdom
 SAMC South African Museum, Iziko Museums of Cape Town, South Africa
 MZLU Museum of Zoology, Lund University, Sweden

Macynia: key to adult males

Head and pronotum yellow with green lateral bands from eyes to back of head, otherwise body mainly brownish green. Antennae green. Body length 42 to 52 mm *M. labiata*
 Head (not pronotum) pale whitish brown, with narrow black lateral bands from eyes to back of head, otherwise body yellowish green. Antennae reddish brown. Body length 57 to 64 mm (Figs 1, 2, 5). *M. mcgregororum* sp. n.

Macynia: key to adult females

Small, rather plump. Usually green with a yellow head and pronotum, with green bands from eyes to back of head. Body mainly smooth. Antennae green. Body length 54 to 63 mm *M. labiata*
 More elongate. Green with dark band. Body with series of prominent lateral whitish tubercles on thorax, less conspicuous on abdomen. Basal area of antennae greenish, otherwise reddish brown. Body length 73 to 84 mm (Figs 3, 4, 6) *M. mcgregororum* sp. n.

Macynia: key to eggs (Figs 8a-e)

Small capsule, dark brown with broad pale band surrounding micropylar plate. Capitulum pale, several strands forming a cap. Capsule length 2mm, width 1.3 mm, height 1.7 mm (Figs 8d, e) *M. labiata*
 Larger capsule, olive with only slightly paler broad band surrounding micropylar plate. Capitulum pale brown, with several straggly strands resembling flower petals when viewed from the top of the capsule. Capsule length 2.7 mm, width 1.8 mm, height 2 mm (Figs 8a-c) *M. mcgregororum*

Macynia Stål

Bacillidae, Macyniinae, Macyniini

Macynia Stål 1875b: 62. Type species: *Mantis labiata* Thunberg 1784, by subsequent designation of Kirby 1904.

Macynia Stål; Kirby 1904: 332; Redtenbacher 1906: 31; Zompro 2004: 263; Otte & Brock 2005: 188.

Characteristics of the genus.— Small wingless phasmids, body slightly glossy, smooth or with lateral tubercles. Antennae much shorter than fore femora. Male subgenital plate reaching about end of 9th abdominal segment. Female operculum exceeding end of 9th ab-

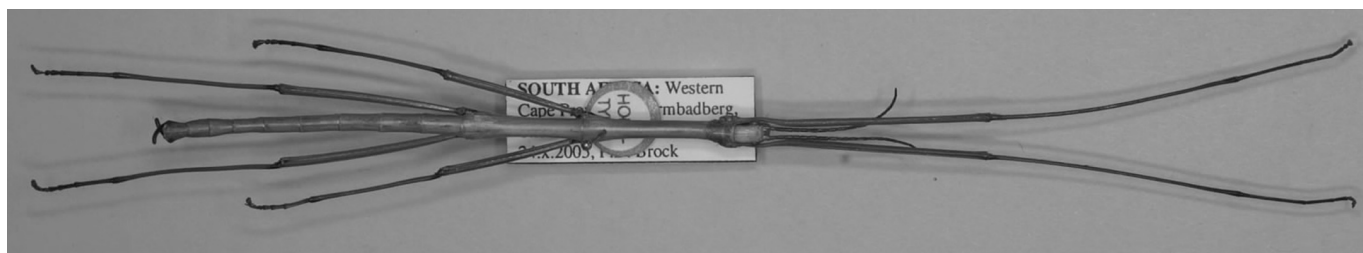


Fig. 1. *M. mcgregorum* holotype male.

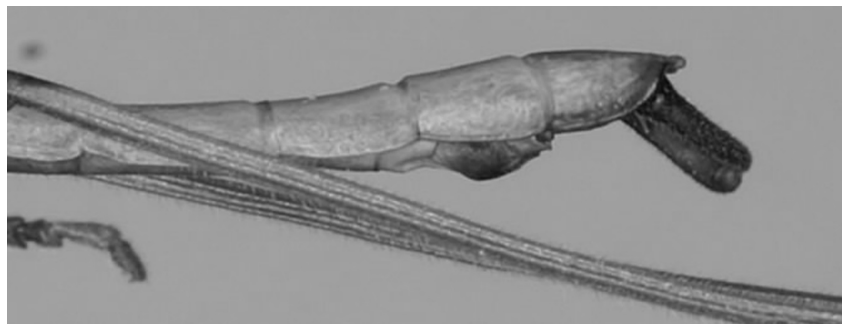


Fig. 2. *M. mcgregorum* end of abdomen in holotype male, lateral view.



Fig. 3. *M. mcgregorum* paratype female.



Fig. 4. *M. mcgregorum* end of abdomen in paratype female, lateral view.



Fig. 5. *M. mcgregorum* holotype male on food plant.



Fig. 6. *M. mcgregororum* paratype female on food plant showing tubercles on thorax.

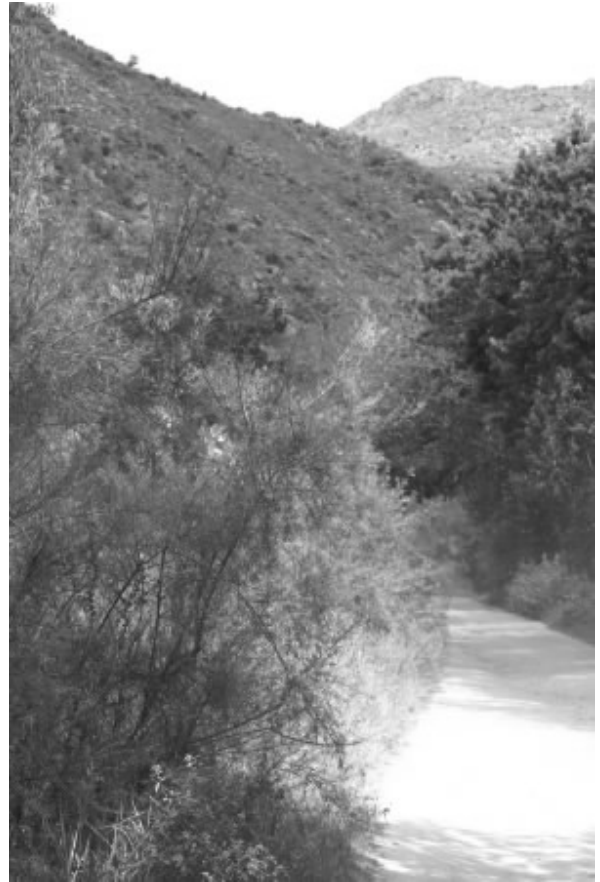


Fig. 7. Habitat of *M. mcgregororum* at 'The Baths', with food plant overhanging track to left.

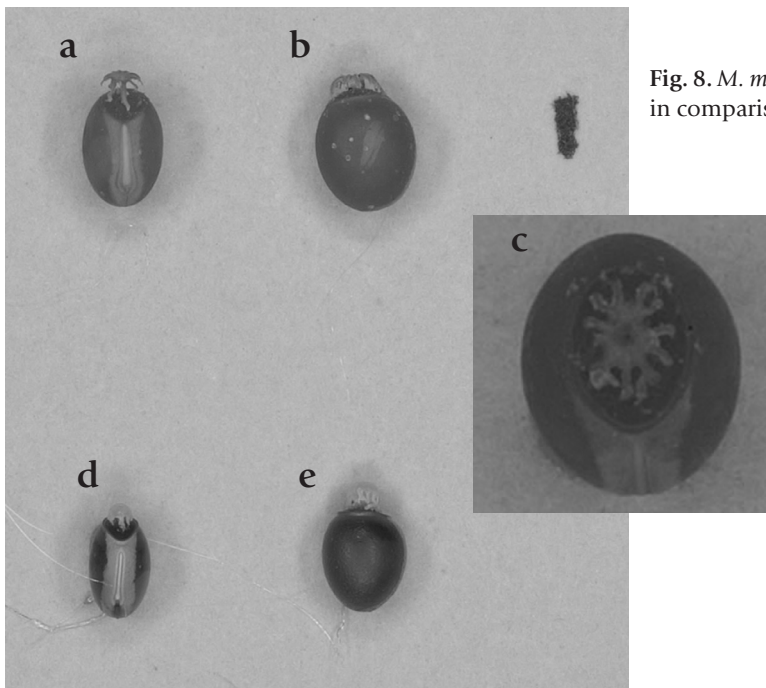


Fig. 8. *M. mcgregororum* eggs a) dorsal b) lateral c) from top, in comparison with *M. labiata* d) dorsal e) lateral.

dominal segment. Cerci long in males, incurved. Eggs: oval, capsule smooth. Micropylar plate more than half length of capsule. Internal micropylar plate open. Long median line present. Operculum oval, flat, with large capitulum.

Distribution.— South Africa: so far only known with certainty from Western Cape.

Species included.—*M. labiata* (Thunberg 1784) Western Cape: Cape Town area, as far north as Koeberg and east to Plettenburg Bay (Brock 2000). Some literature records may be suspect.

M. mcgregorum sp. n. So far only known from Citrusdal area.

Comment.— Zompro 2004 placed *Macynia* in a new subfamily Macyniinae and gave brief characteristics (updated above), commenting that "it is very likely that a higher systematic rank is necessary, but material is too limited to allow for a definitive decision". I am not convinced that *Macynia* even warrants its own subfamily and it appears that the Bacillidae have been split up without sufficient justification (the whole family only comprises 11 genera).

Macynia mcgregorum sp. n.
[McGregor's Stick-insect]
Figs 1-8

Holotype male.— (Figs 1, 2, 5) Small, elongate insect, body yellowish green with reddish brown antennae and cerci. Underside yellow. Body length 63 mm.

Head: longer than broad, with only a few sparse granulations. Black lateral band running from alongside eye to back of head, otherwise whitish brown. Eyes small, brown. Antennae with 20 segments, reaching over half length of fore femora.

Thorax: elongate, with a few sparse granulations dorsally and mainly laterally. Pronotum shorter than head, with bold central indentation. Mesonotum less than 5 × longer than pronotum. Metanotum shorter than mesonotum.

Abdomen: elongate, with sparse granulations laterally. Cerci long, incurved, rounded at tip. End of subgenital plate incised at tip, reaching end of 9th abdominal segment. Anal segment as long as 9th, broadened towards tip, then subtruncate, incised in center.

Legs: elongate, green. All femora with apices dark brown, extending to base of tibiae.

Paratype males: (6 specimens) same as holotype except for slight differences in measurements.

Paratype females.— (6 specimens) (Figs 3, 4, 6). Small, elongate insects, can be plump when at egg-laying peak (but much less so than the type species *M. labiata*). Body with series of prominent whitish tubercles laterally on thorax, less conspicuous on abdomen. Body green with reddish brown antennae (except for base) and cerci. Body length 73 to 84 mm.

Head: longer than broad, with sparse granulations. Brown lateral band running from alongside eye to back of head, otherwise same color as body. Eyes small, brown. Antennae with 19 to 20 segments, reaching almost half length of fore femora.

Thorax: elongate, with a few sparse granulations dorsally and mainly laterally, these being really tubercles, often whitish; otherwise thorax generally as in male.

Abdomen: elongate, with sparse granulations dorsally and particularly laterally. Cerci slender, rounded at tip. Operculum tapering sharply to pointed tip, just exceeding end of anal segment.

Anal segment longer than 9th, tip incised. Supra-anal plate visible dorsally.

Legs: as in male.

Egg: (Figs 8a to c) oval capsule smooth, olive with only slightly paler broad band surrounding micropylar plate. Micropylar plate long and narrow, over half length of capsule and reaching its anterior margin. A long median line present. Capitulum pale brown on a short stalk, with several straggly umbrella-like strands resembling flower petals when viewed from the capsule top. Capsule length 2.7 mm, width 1.8 mm, height 2 mm (measurements based on an examination of 10 eggs).

Table 1. Measurements (mm) of *M. mcgregorum* of holotype. Ranges of paratypes (with mean body length).

	Male (holotype)	Male (paratypes n=6)	Female (paratypes n=6)
Body length	63	57–64 (mean 61)	73–84 (mean 79)
Head	3	2.5–3	4–5
Antennae	15.5	12–17	10–14
Pronotum	2.7	2–2.7	3–4
Mesonotum	13	12–13	14–17
Metanotum	11.5	10–12	11–13
Median segment	2.5	2–2.5	2.5–3
Fore femora	26	22–25	24–30
Mid femora	15	12–15	14–15
Hind femora	19	16–20	17–20
Fore tibiae	26	23–26	24–27
Mid tibiae	14	12–14	12–14
Hind tibiae	18	17–19	16–19
Cerci	3	3 to 3.5	1.5 to 2

Specimens examined.—

Holotype ♂, South Africa: Western Cape, The Baths, Warmbadberg, nr Citrusdal, 32°45'S 19°03'E, 24.x.2005, PD Brock, SAM-PHA-A000154 (SAMC). **Paratypes:** ♀, South Africa: Western Cape, The Baths, Warmbadberg, nr Citrusdal, 32°45'S 19°03'E, 24.x.2005, PD Brock, SAM-PHA-A000155 (SAMC); 3 ♂, 3 ♀, same data, BMNH(E) 2005-98 (BMNH); ♂, same data, except 25.x.2005, BMNH(E) 2005-98 (BMNH); ♀, South Africa: Western Cape, Valhalla Farm, nr The Baths, Warmbadberg, nr Citrusdal, 25.x.2005, PD Brock & A Hall, BMNH(E) 2005-98; 2 ♂, ♀, South Africa: Paleisheuvel, C[ape]. P[rovince]., Mus[eum]. Exp[edition], xi.1948 (SAMC).

Distribution.— So far only found in a small area of the Western Cape, near Citrusdal. Other phasmids from this area tend to have a limited distribution range.

Food Plants.— Found on a straggly, as yet unidentified, native plant growing by the main track into The Baths at the foot of the mountains (Fig. 7) and on nearby farmland. In captivity adults transferred to *Rubus fruticosus*, *Eucalyptus gunnii* and *Hypericum* spp. If reared, a follow-up paper may be published in due course. Eggs are starting to hatch in June 2006.

Behavior.— Well camouflaged on their food plant, lying very flat. First found by using a beating tray beneath branches. When disturbed, both sexes flop around; they may fall to the ground and try to quickly walk away. They also excrete a fluid via their mouthparts. Whilst found singly, after being placed in an all-netting circular cage

with a supply of food plant leaves, they frequently paired up. Spermatophores were observed on the base of the container. Working on counter burns following a bush fire at Valhalla Farm in November 2005, Alan Hall (pers. com.) observed a few specimens of this new *Macynia* species land on the laborers' jackets.

Etymology.— Named after the McGregor family, who have owned The Baths, Citrusdal for over 100 y. A fascinating history of The Baths can be found in Hall 2003. Thunberg described *Macynia labiata* in 1784 (locality not recorded, but probably Cape Town area), but apparently did not locate this new *Macynia* species during his visit to The Baths in 1773. However, Linnaeus' most distinguished pupil is, of course, better known for his major botanical contributions. Details of Thunberg's phasmid type material are included in Brock 2002.

Clonaria Stål

Diapheromeridae, Pachymorphinae, Gratidiini

Clonaria Stål 1875a: 5. Type species: *Bacillus natalis* Westwood 1859, by subsequent designation of Kirby 1904: 337.

Clonaria Stål; Stål 1875b: 14, 71; Brunner 1893: 89; Kirby 1904: 337; Brunner 1907: 217*; Rehn 1933: 61; Brock 2005: 29; Otte & Brock 2005: 97. *As synonym of *Gratidia*; however, *Clonaria* pre-dates *Gratidia*.

= *Gratidia* Stål 1875b: 14, 70. Type species: *Gratidia sansibara* Stål 1875, by original designation, synonymised by Brunner 1907: 217.

Gratidia Stål; Kirby 1904: 330; Brunner 1907: 217; Rehn, 1933: 61; Brock, 2005: 29; Otte & Brock 2005: 97.

= *Paraclonaria* Brunner 1893: 89. Type species: *Paraclonaria hamuligera* Schulthess 1898, by subsequent designation of Rehn 1904, synonymised by Brunner 1907: 217.

Paraclonaria Brunner; Rehn, 1904: 83; Kirby 1904: 335; Brunner 1907: 217; Brock, 2005: 29; Otte & Brock 2005: 97.

Many of the 128 species of *Clonaria* Stål 1875, have been confused with other genera, being described in the genus *Gratidia* Stål or in *Ramulus* Saussure 1862.

Characteristics of the genus.—Small to medium-sized wingless, elongate phasmids, remarkably so in many species. Antennae (12 to 18 segments) always very short, up to about half length of fore femora. Metanotum about the same length or longer than mesonotum. Anal segment in male truncate or slight emarginated. Female operculum variable. Cerci often incurved in male. Eggs: cigar-shaped, glued to suitable surfaces. Micropylar plate long and narrow. Distribution: throughout Africa.

Clonaria cederbergensis sp. n. [Cederberg Stick-insect] Figs 9-14

Holotype male.—(Figs 9,10) Elongate, small, mid to dark brown insect, with irregular whitish markings, particularly on head and thorax; bold longitudinal black median stripe present along whole

of body. Body length 51 mm.

Head: longer than broad, eyes small. Black stripe boldest on head and pronotum, further black lateral stripe. Antennae short, with 12 segments, reaching just under half length of fore femora; basal segment much longer and broader than segments 2 to 12.

Thorax: pronotum slightly shorter than head, with bold central indentation. Mesonotum four and a half times longer than pronotum. Metanotum slightly longer than mesonotum.

Abdomen: elongate. End of anal segment subtruncate. Cerci slender, incurved at tip. Subgenital plate rounded at tip, reaching end of 9th abdominal segment.

Legs: elongate, slightly mottled.

Paratype females.— (two specimens, one a nymph) (Figs 11-13). Slender, dark greyish-brown, with many flecks and blotches. Longitudinal median black line narrower than in male, with irregular dorsal stripes either side, almost laterally. Body length 64 mm (nymph 50 mm).

Head: as in male.

Thorax: as in male. Appears scabrous, largely due to irregular flecks and blotches.

Abdomen: as in male, except cerci broad, rounded at tip. End of anal segment truncate, supra-anal plate visible. Operculum short, tapered to a pointed tip, just reaching beyond end of 8th abdominal segment.

Legs: as in male, except less elongate.

Egg: (Fig. 14) almost cigar-shaped, heavily sculptured, rough capsule. Micropylar plate long and narrow, almost reaching opercular rim. In captivity the egg was glued by the operculum to surfaces, in a manner similar to an unrelated Mauritian species (Cliquennois & Brock 2004): not necessarily flat on the operculum, so in time it may hang by a thread. So far, in other *Gratidia* species, the whole egg is glued to suitable surfaces such as twigs or leaves, with no obstruction to the operculum [I have reared several African *Gratidia* species, including the type species *C. natalis* (Westwood 1859)]. Capsule length 6 mm, width 1 mm, height 0.8 mm (measurements based on an examination of five eggs).

Table 2. Measurements of *C. cederbergensis* (mm).

	Male (holotype)	Female (paratype adult) 50-mm nymph not measured
Body length	51	64
Head	2.5	3
Antennae	9	4
Pronotum	2	2.3
Mesonotum	9	10
Metanotum	11	12
Median Segment	1	1
Fore Femora	19	16
Mid Femora	13	11
Hind Femora	17	15
Fore Tibiae	21	18
Mid Tibiae	13.5	11
Hind Tibiae	19	15
Cerci	1.7	0.8

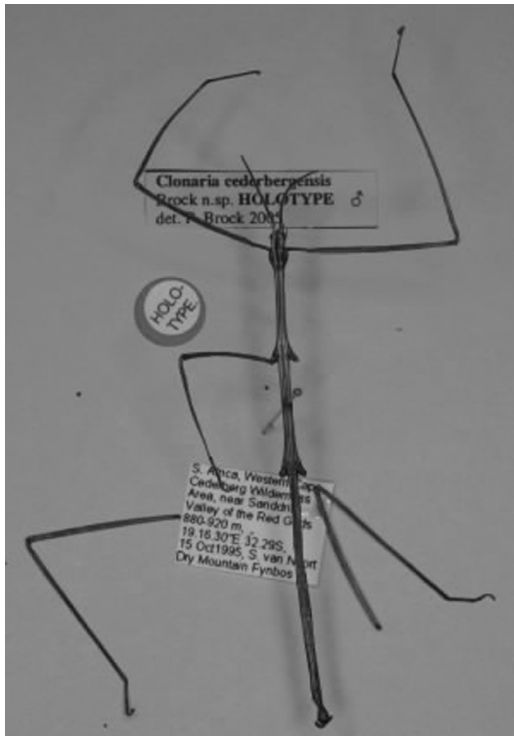


Fig. 9. *C. cederbergensis* holotype male.

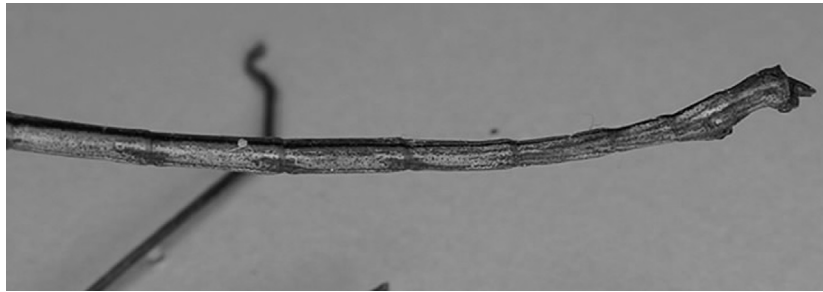


Fig. 10. *C. cederbergensis* end of abdomen in holotype male, lateral view.

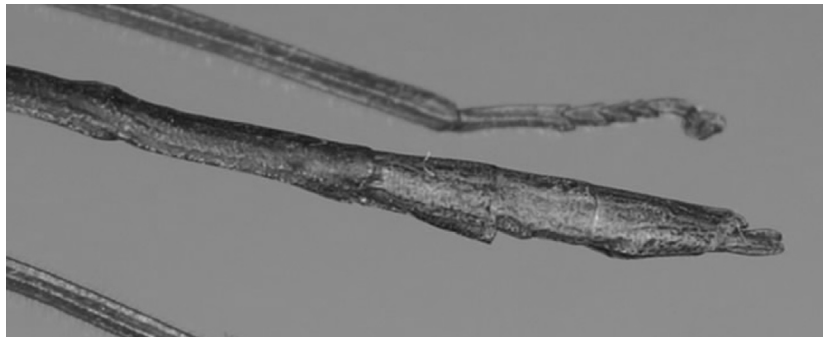


Fig. 12. *C. cederbergensis* end of abdomen in paratype female, lateral view.



Fig. 11. *C. cederbergensis* paratype female.



Fig. 13. *C. cederbergensis* paratype female, well camouflaged on its food plant.



Fig. 14. *C. cederbergensis* egg views: dorsal (left) lateral (right).

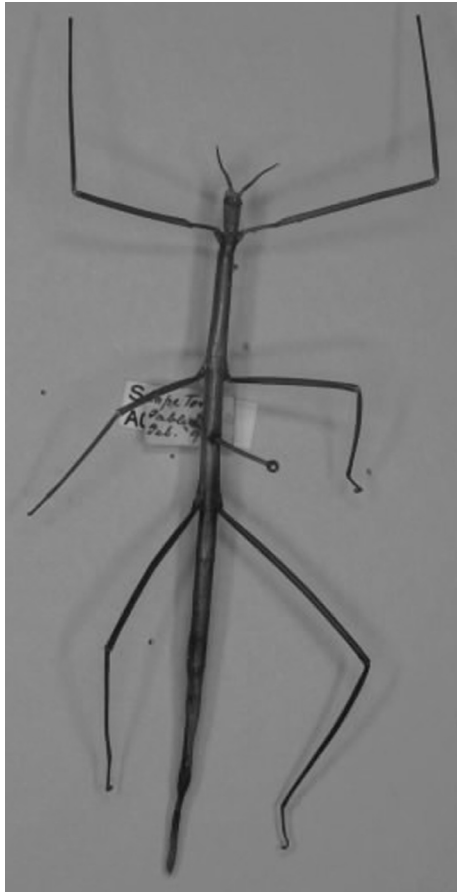


Fig. 15. *C. montana* holotype female.

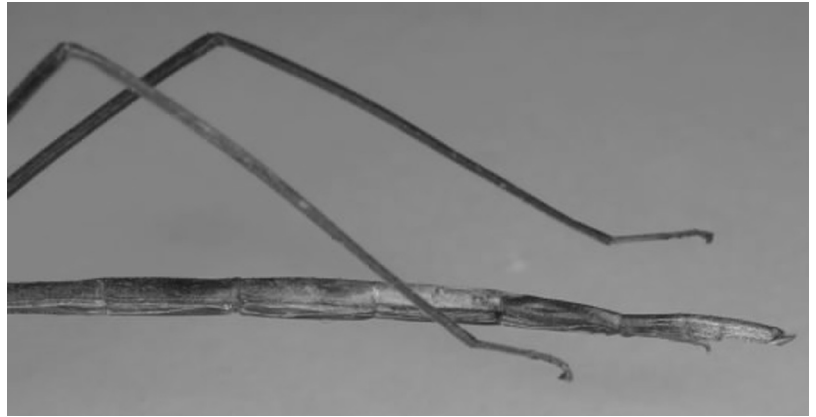


Fig. 16. *C. montana* end of abdomen in holotype female, lateral view.

Specimens examined.—

Holotype ♂, S[outh] Africa: Western Cape, Cederberg Wilderness Area, nr Sanddrif, Valley of the Red Gods, 880-920m., 19°16'30"E, 32°29'S., 15.x.1995, S. van Noort, Dry Mountain Fynbos, SAM-PHA-A000147 (SAMC). **Paratypes:** ♀, South Africa: Western Cape, Wolfdrif, nr Pakhuis Pass, 29km NE Clanwilliam, 32°00'993"S 19°03'467"E, 21.x.2005, PD Brock, SAM-PHA-A000156; ♀ nymph, same data as holotype (SAMC).

Distribution.—So far only found in and around the Cederberg Wilderness area.

Food Plants.—Not yet identified. The female collected by the author only lived a few days and apparently died from old age, laying 5 eggs.

Behavior.—Remarkably well camouflaged on vegetation.

Etymology.— Named after the amazing Cederberg Wilderness area, well known for its interesting wildlife, including localised insect species feeding on vegetation of the dry mountain fynbos.

Notes.— Having reviewed *Clonaria* species from southern Africa, I am confident that *C. cederbergensis* has not already been described. The genus *Clonaria* includes species with remarkably elongate males, such as the type species *C. natalis* (Westwood 1859), and species with more robust-looking males, including this new species. *C. cederbergensis* is reasonably closely related to *C. annulata* (Westwood 1859) known from the holotype male (BMNH, type locality unknown), an apparently uncommon species. Whilst Kirby 1904

listed 'Cape' and may have been aware of other data not included on the data label, the locality is not known. I believe it may occur in Eastern Cape. *C. annulata* is pale grey, with a black line from mid-head to front of mesonotum and has much shorter fore legs than *C. cederbergensis*.

Clonaria montana sp. n.
[Cape Mountain Stick-insect]
Figs 15-16

Holotype female.— (Figs 15-16) Elongate, small dark brown insect, slightly mottled and sparsely granulated, but rather plain. Body length 66 mm.

Head: twice as long as broad, eyes small. Faint darker lateral line from eye to back of head. Antennae very short, with 15 segments; basal segment broader than remainder.

Thorax: pronotum much shorter than head, with bold central indentation. Mesonotum almost four times longer than pronotum. Metanotum slightly longer than mesonotum.

Abdomen: elongate. Cerci slender, rounded at tip. End of anal segment truncate, supra-anal plate visible. Operculum short, tapered to an almost rounded tip, just reaching beyond end of 8th abdominal segment.

Legs: elongate.

Table 3. Measurements (mm) of *C. montana*.

	Female (holotype)	Female (paratypes)
Body length	66	61
Head	4	4
Antennae	5	4.5–5
Pronotum	3	2.5
Mesonotum	11	11–12
Metanotum	12	11.5–12
Median Segment	1	1
Fore Femora	21	20
Mid Femora	16	13–14
Hind Femora	18	17–19
Fore Tibiae	20	18–21
Mid Tibiae	15	12–15
Hind Tibiae	19	16–20
Cerci	0.4	0.4

Paratype females.— (2 specimens). As in holotype except for size differences.

Holotype ♀, [South Africa: Western Cape], Cape Town, Table Mountain, ii.18]92, R.M.L., SAM-PHA-A000074 (SAMC).
Paratypes: ♀, [South Africa: Western Cape], Strandfontein, iii.1950, Zinn, Hesse, SAM-PHA-A000146 (right mid leg lost), [South Africa: Western Cape], Ceres Div., Matroosberg, 3500 ft., Lightfoot, i.1917, SAM-PHA-A000054 (both in SAMC).

Distribution.— So far only found in Western Cape in widespread localities. It is hoped that searching will reveal this species to still be present, as it was last found in 1950. My efforts to trace it were unsuccessful.

Food Plants.— Not known.

Behavior.— Not known.

Male: not known for certain, although I believe this is the 54mm *Ramulus* sp. single male discussed by Günther 1956, collected in Rondesbosch, 25.i.1951 (MZLU). The specimen is in poor condition, with most of the antennae lost, and no fore and hind legs [examined briefly], hence I am reluctant to regard it as part of the type series.

Etymology.— Named after 'mountain', although it is not known whether this specimen was found in the foothills of Table Mountain or at higher altitude. The common name 'Cape Mountain Stick-insect' also relates to the type locality, where it is hoped this insect still survives. I did not have time to make an extensive search for it at Table Mountain, but have briefly searched at various altitudes on many plants, finding other phasmids, *Macynia labiata* (Thunberg 1784) and *Phalces brevis* (Burmeister 1838), in abundance, mainly nymphs. It is likely that *C. montana* feeds on different food plants and may be difficult to find except by searching at night.

Notes.— See comments in 'notes' above for *C. cederbergensis*, from which *C. montana* is readily distinguished by its plain color and more elongate head.

Conclusion

Whilst these descriptions of new species derive from all unidentified Western Cape material in major South African museums, other species may have been overlooked in the wild. Phasmids are well worth searching for in little-known localities, either by beating or by torchlight. Some phasmid enthusiasts do not look for these insects at all in the daytime, because they tend to be difficult to spot. However, using a beating tray can be rewarding for phasmids, with 4 out of 6 species collected in Western Cape during October 2005 located using that method, including the new *Macynia* species.

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