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A review of Afrotropical plant-lice of the genus *Moraniella*, with description of a new species (Hemiptera: Psylloidea: Psyllidae: Rhinocolinae)

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ABSTRACT

Moraniella bella sp. n. is added to the hitherto monotypic Afrotropical genus *Moraniella*. The new species from South Africa is described, illustrated and compared with *M. calodendri*. On the basis of the new species an emended diagnosis of *Moraniella* is provided. *M. bella* is associated with *Protorhus longifolia* (Anacardiaceae), a host family typical for the Rhinocolinae. The single available larva was parasitised by an unidentified chalcidoid wasp.

KEY WORDS: Hemiptera, Psylloidea, *Moraniella*, plant-lice, Anacardiaceae, South Africa, taxonomy.

INTRODUCTION

The subfamily Rhinocolinae constitutes a small group of jumping plant-lice (Hemiptera, Psylloidea, Psyllidae) with world-wide distribution. In the Afrotropical region the subfamily is represented by the following genera: *Cerationotum* (3 spp.), *Agonoscena* (1 sp.), and *Moraniella* (1 sp.). The former two belong to a clade of genera with Palaearctic and Oriental affinities, whereas *Moraniella* constitutes the sister taxon to three Neotropical genera, viz. *Tainarys* (6 spp.), *Leurolophus* (2 spp.) and *Notophyllura* (4 spp.) (Burckhardt & Basset 2000).

Moraniella comprises to date a single species, *M. calodendri* (Moran, 1968), which is associated with Cape Chestnut (*Calodendrum capense*, Rutaceae). In the definition of Burckhardt and Lauterer (1989) *Moraniella* differs from other Rhinocolinae in the presence of genal processes in the adult and in the presence of sectasetae in the larva. During field work in South Africa we discovered a second member of *Moraniella* on *Protorhus longifolia* (Anacardiaceae) which is described below. The discovery of the new species allows to test the generic concept proposed by Burckhardt and Lauterer (1989).

MATERIAL AND METHODS

The specimens were collected into 70 % ethanol and later air dried and mounted on card points or cleared in 10 % KOH, dissected and mounted in Canada Balsam on microscopical slides. Morphological terminology follows mostly Ossiannilsson (1992). Material is deposited in the Naturhistorisches Museum Basel (NHMB), South African National Collection of Insect, Plant Protection Research Institute, Pretoria (SANC), and Zoologische Staatssammlung München (ZSM).

TAXONOMY

Genus *Moraniella* Loginova, 1972

Type species: *Paurocephala calodendri* Moran, 1968, by original designation.

Revised diagnosis:

Adult. Head broadly rounded anteriorly, bearing small conical processes at the base of genae; coronal suture fully developed. Antenna 10-segmented, with a single subapical rhinarium on each of segments 4, 6, 8 and 9. Propleurites subdivided by oblique suture into small episternum and large epimeron. Forewing elongate, oval, widest across the middle; costal break and pterostigma developed; vein C+Sc narrow, cell m_1 long and comparatively narrow, vein Cu_{1b} very short, much shorter than Cu_1, cell cu_1 very long. Metacoxa with relatively small, weakly sclerotised tubular process on trochanteral cavity.

Male proctiger 1-segmented. Paramere lamellar. Distal segment of aedeagus dilated apically with short, weakly sinuous sclerotised end tube of ductus ejaculatorius. Female terminalia relatively short with oval circumanal ring.

Fifth instar larva. Body elongate. Apical tarsal segment differentiated.

Egg (known only from *M. calodendri*). Oval with pedicel and apical filament.

Species included: *M. calodendri* (Moran, 1968) and *M. bella* sp. n.

Moraniella bella sp. n.

Figs 1–16

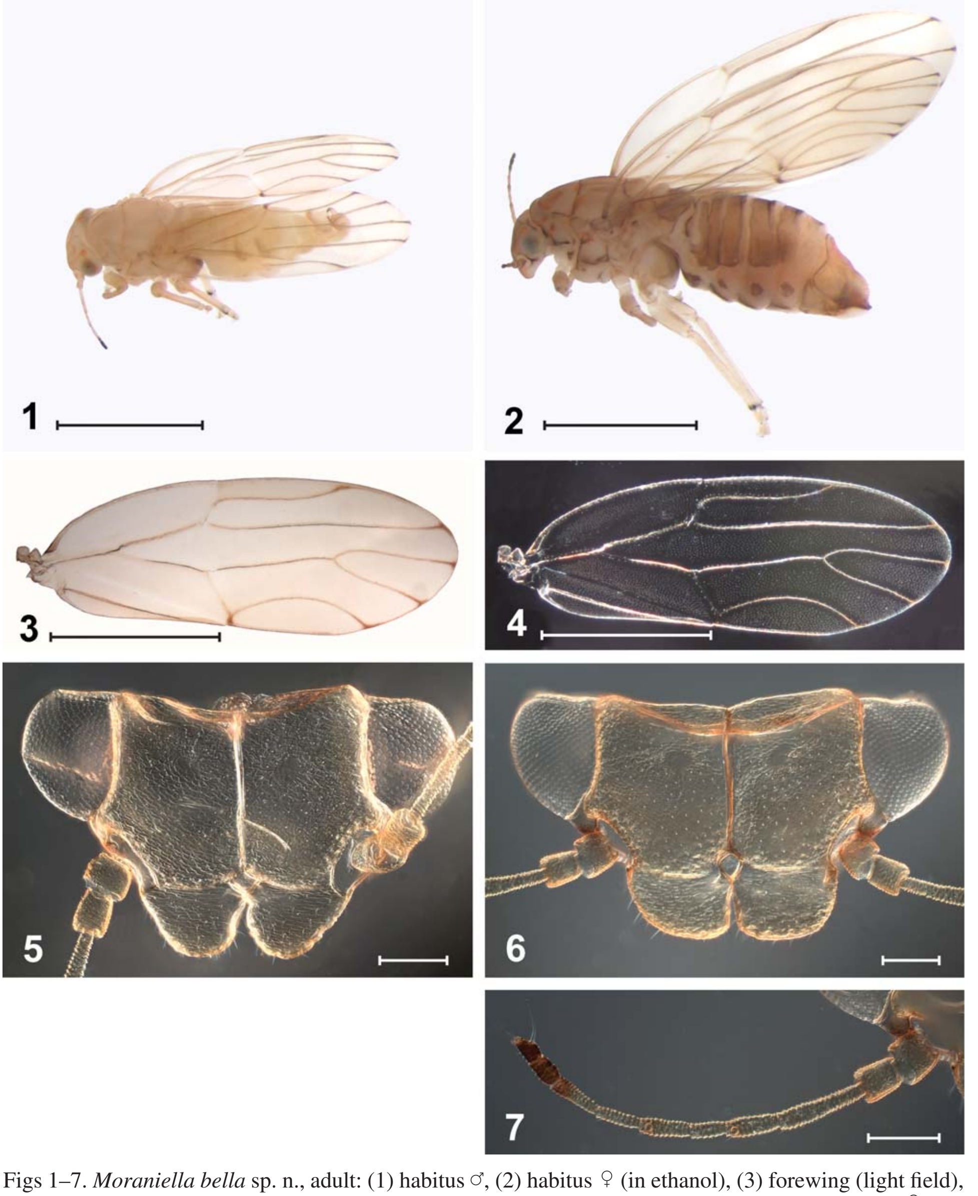
Etymology: From Latin *bella* (handsome).

Description:

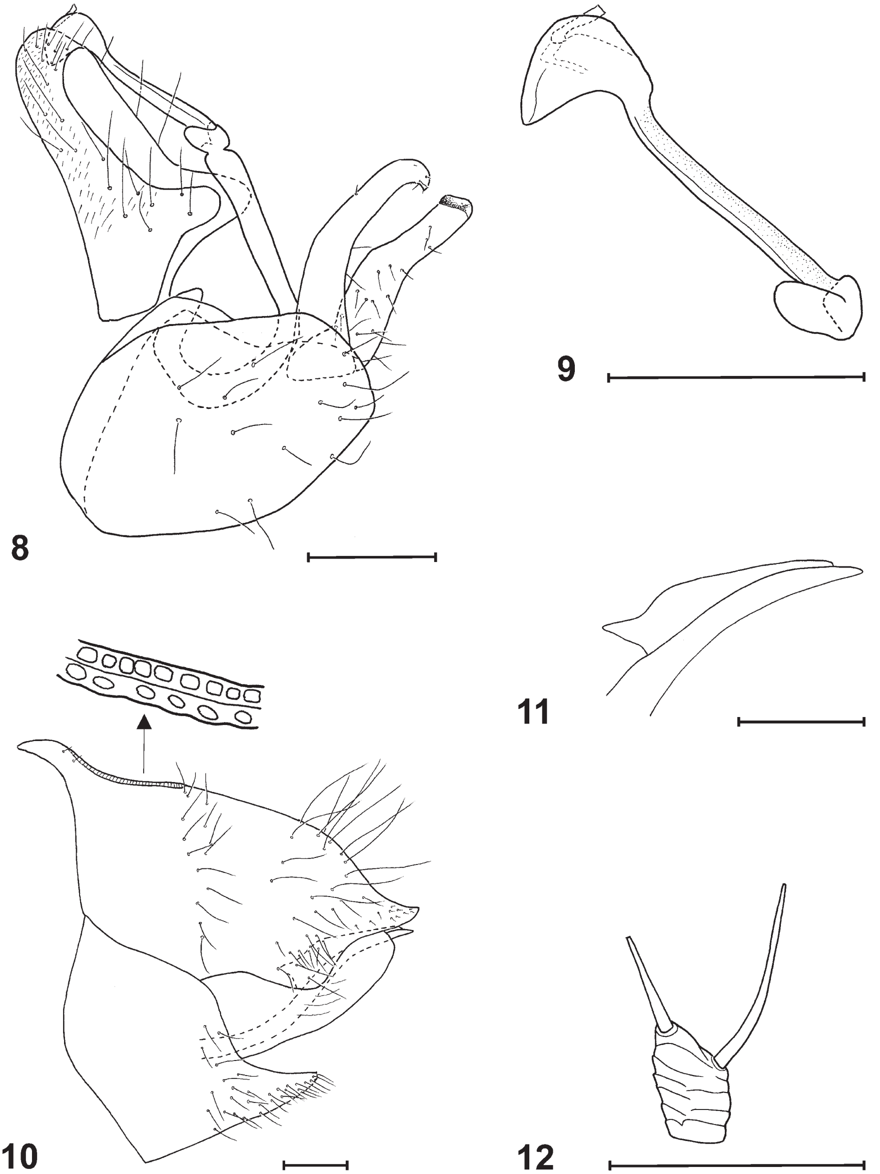
Adult (Figs 1–12).

Coloration: Male (Fig. 1) greenish yellow dorsally, whitish yellow ventrally. Eyes grey, ocelli orange. Antenna yellow, segments 1 and 2 greyish, 4 and 6 light brown apically, 8 dark brown apically, 9 and 10 almost black. Tip of rostrum black. Forewing membrane transparent, almost colourless in basal half and very weakly ochreous in apical half; veins yellow in basal half and greyish brown in apical half, apices of veins conspicuously darker, almost black (Fig. 3). Hindwing transparent, colourless to whitish. Claws and metacoxa grey, apical metatibial and lateral metabasitarsal spurs black. Abdominal tergites ochreous. Tip of paramere black. Female (Fig. 2) light ochreous dorsally, greyish yellow ventrally. Head and thorax with orange spots and very fine dark brown or black lines along median suture of vertex and bordering mesoscutellum and mesoscutum as well as along sutures of propleura and mesopleura. Metanotum ochreous. Wings as in male but forewing membrane darker, ochreous. Legs as in male but femur, tibia and tarsus of fore and mid legs light brown. Metacoxa and dorsal side of metafemur grey. Abdominal tergites entirely and sternites laterally brown, intersegmental membranes orange-red. Terminalia ochreous, tip of proctiger almost black, tip of dorsal and ventral valvulae dark brown or black, lateral valvulae whitish.

Morphology: Head (Figs 5, 6) inclined at about 90° to longitudinal body axis (Fig. 2); slightly wider than pronotum and slightly narrower than mesoscutum. Vertex subrectangular, more or less evenly covered in microsculpture and sparse microscopical setae, anteriorly evenly rounded to genae; coronal suture fully developed; anterolateral angle forming small tubercle. Preocular sclerite developed, narrow. Genae developed into conical processes, bluntly subacute in male (Fig. 5) and truncate in female (Fig. 6), about half as long as vertex along mid-line and positioned in a plane below that of vertex. Antenna (Fig. 7) 10-segmented, segment 3 slightly thicker in apical half than in basal half, segments 5 and 7 more slender than segments 4, 6 and 8; single subapical rhinarium present on each of segments 4, 6, 8 and 9; terminal setae on segment 10 about 1.0 and 1.5 times as long as segment (Fig. 12). Clypeus pear-shaped, flattened; rostrum short. Thorax (Figs 1, 2) relatively flat dorsally. Propleurites oblique, not fully visible in lateral view; rectangular, subdivided by oblique suture. Forewing (Figs 3, 4)

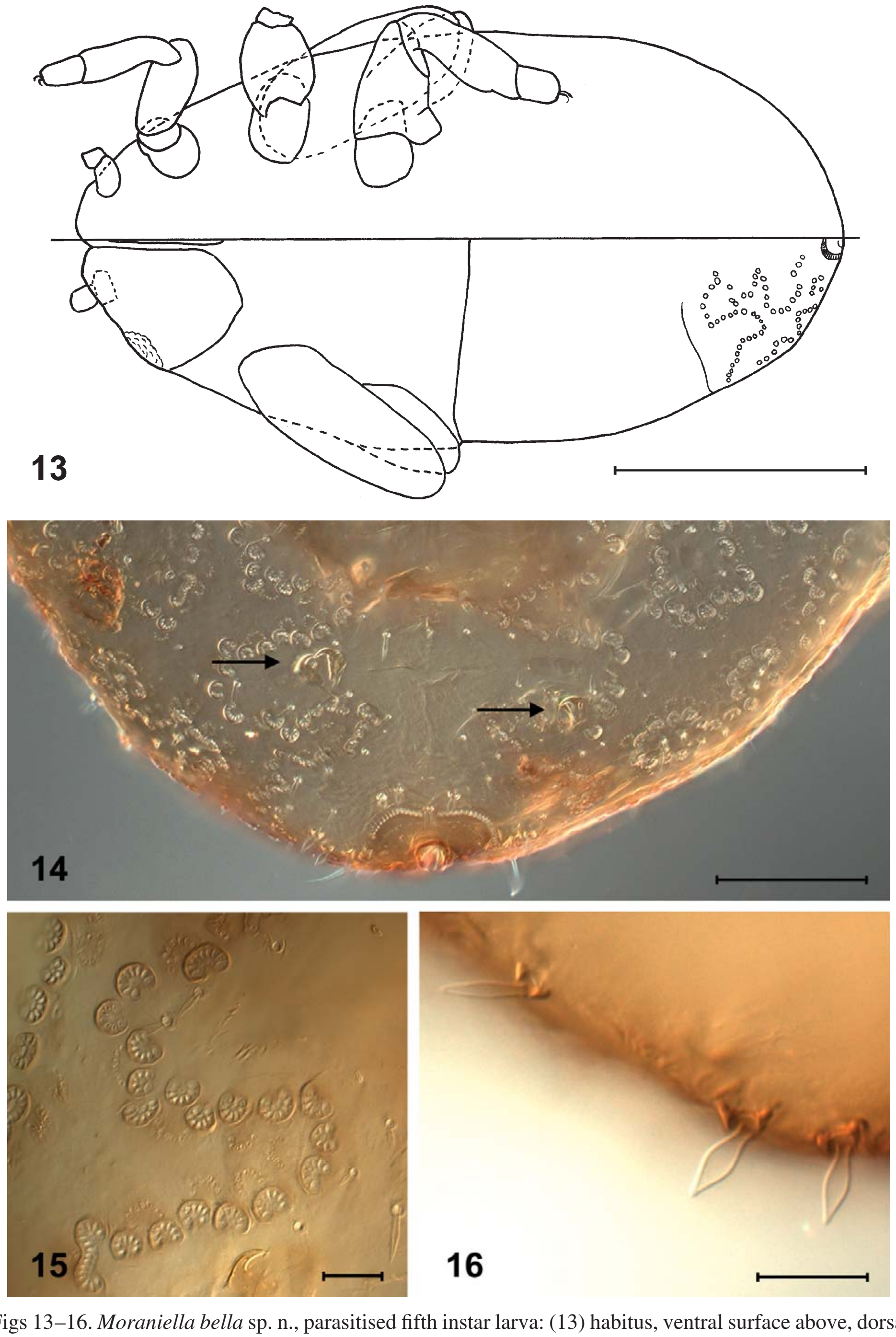


Figs 1–7. *Moraniella bella* sp. n., adult: (1) habitus ♂, (2) habitus ♀ (in ethanol), (3) forewing (light field), (4) forewing (dark field) showing extension of surface spinules, (5) head ♂, (6) head ♀, (7) antenna. Scale bar = 1.0 mm in Figs 1–4, 0.1 mm in Figs 5–7.



Figs 8–12. *Moraniella bella* sp. n., adult: (8) ♂ terminalia, in profile; (9) distal segment of aedeagus, in profile; (10) ♀ terminalia, in profile, with detail of circumanal ring; (11) ♀ valvulae; (12) antennal segment 10. Scale bars = 0.1 mm.

elongate, oval; costal break developed; cell c+sc relatively long; veins R and M+Cu_1 subequal; vein Rs almost straight; cell m_1 elongate, cell cu_1 very narrow and long; surface spinules (Fig. 4) present in all cells, leaving relatively broad spinule-free stripes along the veins, evenly spaced, forming irregular squares in cell r_2 above bifurcation of vein M. Metacoxa bearing small tubercle near insertion of meracanthus. Metatibia



Figs 13–16. *Moraniella bella* sp. n., parasitised fifth instar larva: (13) habitus, ventral surface above, dorsal surface below; (14) caudal plate, dorsal view; arrows indicate the mandibles of chalcidoid parasitoids; (15) detail of caudal plate showing wax pores; (16) lanceolate setae on margin of caudal plate. Scale bar = 0.5 mm in Fig. 13, 0.1 mm in Fig. 14, 0.02 mm in Figs 15, 16.

very long with open crown of 7 strongly sclerotised, densely arranged apical spurs. Metabasitarsus with small outer spur and minute inner lateral spur.

Terminalia (Figs 8–11). Male proctiger (Fig. 8) bearing short posterior extensions near base. Subgenital plate subglobular, covered in sparse long setae. Paramere slender, digitiform, weakly bent backwards in the middle, evenly tapering to apex, which strongly sclerotised and forms inwardly directed hook; outer face almost glabrous, inner face bearing sparse long setae. Aedeagus 2-segmented; apical segment bearing a collar-like ring basally, apex expanded to form a hook (Fig. 9); sclerotised end tube of ductus ejaculatorius short, weakly sinuous. Female terminalia short (Fig. 10), proctiger thick-set ending in a sclerotised point, bearing transverse row of long setae in middle and long setae apically. Circumanal ring oval, consisting of two rows of pores; inner pores subrectangular and outer ones oblong oval. Subgenital plate elongate, pointed apically with setae in apical half. Valvula dorsalis curved with microscopical teeth apically; valvula ventralis weakly curved (Fig. 11), pointed; valvula lateralis membranous.

Measurements (in mm) *and ratios* (1♂, 1♀): Head width (HW) 0.63–0.75; antennal length (AL) 0.66–0.67; AL/HW 0.89–1.05; relative length of antennal flagellar segments ♂ 1.00:0.65:0.41:0.47:0.47:0.41:0.35:0.24, ♀ 1.00:0.53:0.35:0.53:0.47:0.53:0.65:0.35; forewing length (WL) 1.82–2.47; WL/HW 2.89–3.29; WL/forewing width 2.38–2.47; metatibia length (TL) 0.71–0.81; TL/HW 1.08–1.13; male proctiger length (MP) 0.22; MP/HW 0.35; paramere length 0.17; length of distal aedeagal segment 0.16; female proctiger length (FP) 0.66; FP/HW 0.88; FP/circumanal ring length 2.05; FP/female subgenital plate length 3.36.

TABLE 1

Morphological characters separating *Moraniella* species, with data on their distribution and host plants.

	M. bella **sp. n.**	*M. calodendri* (Moran, 1968)
Adult		
AL/HW	usually ≤ 1	usually ≥ 1
posterior margin of male proctiger	with short extensions near base (Fig. 8)	weakly evenly convex
paramere, in profile	bent in the middle, narrow apically (Fig. 8)	straight, dilated apically
base of distal segment of aedeagus	with collar-like ring (Fig. 9)	lacking collar-like ring
apical dilatation of distal segment of aedeagus	hook-shaped (Fig. 9)	lense-shaped
dorsal margin of female proctiger	convex (Fig. 10)	weakly concave or almost straight
apex of female proctiger	pointed (Fig. 10)	blunt
Fifth instar larva		
body margin	with lanceolate setae (Fig. 16)	with sectasetae
humeral lobe on forewing-pad	absent (Fig. 13)	present
tarsal claws	present (Fig. 13)	absent
position of anus	terminal (Fig. 14)	ventral
extra pore fields	present (Figs 14, 15)	absent
Distribution	South Africa: KwaZulu-Natal	Kenya; South Africa: Eastern Cape (Burckhardt & Lauterer 1989)
Host plant	*Protorhus longifolia* (Bernh.) Engl. (Anacardiaceae)	*Calodendrum capense* Thunb. (Rutaceae)

Fifth instar larva (described from a parasitised specimen which is lacking the antennal flagella and some of the legs) (Figs 13–16).

Coloration: Light ochreous with brown claws and circumanal ring.

Morphology: Body elongate, sparsely covered in very small lanceolate setae on dorsum. Forewing bud elongate, lacking humeral lobe, margin bearing sparse lanceolate setae similar to those on dorsum. Hindwing bud elongate. Legs moderately long with differentiated apical tarsal segment. Claws present, tarsal arolium small. Circumanal ring small (Figs 13, 14); consisting of a single row of pores, in terminal position. Additional pore field present, consisting of oval pore plates containing up to 10 pores and arranged in undulating lines on dorsal face of caudal plate (Figs 14, 15). Caudal plate bearing small marginal lanceolate setae similar to those on the rest of the body (Fig. 16).

Measurements (in mm) *and ratios* (1 parasitised larva): Body length (BL) 1.53; BL/ body width 1.44; forewing pad length 0.41.

Egg. Unknown.

Holotype: ♂ SOUTH AFRICA: *KwaZulu-Natal*: Kloof, Everton Gorge Conservancy, 29°46'S:30°48'E, alt. 400 m, 24.vii.2008, on *Protorhus longifolia* (Anacardiaceae) growing in forested creek, D. Burckhardt & M. Kotrba (dry mounted, SANC).

Paratypes: 5♂ 5♀ and 1 parasitised larva with same data as holotype (one pair in 70 % ethanol, the rest dry and slide mounted, NHMB, SANC, ZSM).

Comparison: Differences between *M. calodendri* and the new species are detailed in Table 1.

Comments: The only larva available is parasitised showing the characteristically inflated body shape. Within the larval abdomen the mandibles of two parasitoid larvae are visible (Fig. 14). They belong to Hymenoptera, Chalcidoidea. The parasitised larva was collected from a leaf of *Protorhus longifolia,* where it was sitting on the leaf blade submerged in honeydew.

DISCUSSION AND CONCLUSION

Adults of *Moraniella bella* are morphologically similar to those of *M. calodendri*, differing mostly in details of the male and female terminalia (Table 1). They fit well the generic diagnosis of *Moraniella* provided by Burckhardt and Lauterer (1989). In particular the presence of genal processes, a character which is unique within the Rhinocolinae, is shared by both species. The similarity of the adults is in stark contrast to the differences found in the fifth instar larvae (Table 1). One of the two alleged autapomorphies of *Moraniella* proposed by Burckhardt and Lauterer (1989), the presence of sectasetae, is not of generic significance but only an autapomorphy of *M. calodendri*. Sectasetae and lanceolate setae are probably homologous and both may occur within the same genus (e.g., the large neotropical genus *Heteropsylla*; Muddiman *et al.* 1992). The most striking morphological difference between the larvae of *M. bella* and of *M. calodendri* is the terminal *vs* ventral position of the anus, suggesting differences in the larval biology such as feeding sites.

The host plant of *M. bella*, *Protorhus longifolia* (Anacardiaceae), is related to that of *M. calodendri* which develops on *Calodendrum capense* (Rutaceae). Both plant families are members of the Anacardiales/Rutales/Sapindales which are also the primary host taxa of the Rhinocolinae in general (White & Hodkinson 1985; Burckhardt & Lauterer 1989).

Additional targeted field work is necessary to find additional larval material and eggs. This should not be too difficult since the host-plant is known.

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