

Chapter 4

The First *Beckeriella* Williston from the Afrotropical Region: Two New Species from Madagascar (Diptera: Ephydriidae)

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Abstract

Two new species of the shore-fly genus *Beckeriella* are described from specimens collected on the island of Madagascar. These are the first species of *Beckeriella* from the Afrotropical Region, and aside from *B. filipina* (from the Philippines), they are the first species of the genus to be described from regions outside of the New World tropics, where the genus has its greatest diversity.

Résumé

Deux nouvelles espèces du Madagascar du genre "la mouche de la plage" *Beckeriella* sont décrites. Ce sont les premières espèces du genre *Beckeriella* récoltées dans la région afrotropicale. Hors *B. filipina* (des Philippines) les espèces décrites ici sont les premières qui proviennent des régions autres que les néotropiques, où ce genre a actuellement la plus grande diversité.

Introduction

Beckeriella Williston is an uncommonly collected genus of shore flies that, until recently, was represented by 10 New World species (Mathis & Zatwamicki, 1995). Four years ago, however, Lizaralde de Grosso (1994) described *B. filipina* from the Philippines, which substantively and somewhat anomalously increased the known distribution for the genus. Such an apparent disjunct distribution between the Philippines and the tropical neotropics was unknown among the Ephydriidae. Here we extend even further the known worldwide distribution and describe two new species from Madagascar, the first of this genus from

the Afrotropical Region. This further expands the known distribution of *Beckeriella* and alters our ideas about the historical origins and phylogeny of the genus.

Methods

The terminology and methods used in this study were explained previously (Mathis, 1990). Because of the small size of the specimens, study and illustration of the male terminalia required the use of a compound microscope. To ensure effective communication about structures of the male terminalia, we have adopted the terminology of other workers in Ephydriidae (see references in Mathis, 1986). Usage of these terms, however, should not be taken as an endorsement of them from a theoretical or morphological view over alternatives that have been proposed (Cumming et

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al., 1995; Griffiths, 1972; McAlpine, 1981). Rather, we are deferring to tradition until the morphological issues are better resolved.

Three ratios (one cephalic, two venational) are commonly used in the descriptions and are defined here for the convenience of the user (ratios are ranges based on three specimens): 1. Gena-to-eye ratio is the genal height measured at the maximum eye height divided by the eye height. 2. Costal vein ratio is the straight-line distance between the apices of veins R_{2+3} and R_{4+5} /distance between the apices of veins R_1 and R_{2+3} . 3. M vein ratio is the straight-line distance along M between crossveins dm-cu and r-m/distance apical of crossvein dm-cu.

Tribe Gastropini Cresson

Gastropini Cresson, 1949:250 (as Gastropsini).

TYPE GENUS—*Gastrops* Williston, 1897 (Zatwarnicki, 1995:127–130 [world catalog]).

DISCUSSION—Williston (1897) described both genera, *Beckeriella* and *Gastrops*, that now make up the tribe Gastropini, which until recently was placed in the subfamily Parydrinae (Cresson, 1949; Lizarralde de Grosso, 1989; Wirth, 1968). Currently the tribe is placed in the subfamily Gymnomyzinae, based on Zatwarnicki's (1992) assessment of characters of the male terminalia. Although the tribe is undoubtedly monophyletic (Mathis, 1977), other aspects concerning the phylogenetic relationships of the tribe, such as identification of the tribe's sister group and the monophyly of the two included genera, are unresolved. Two colleagues, Stark (pers. comm.) and Lizarralde de Grosso (pers. comm.), are now studying these phylogenetic issues as part of more comprehensive research on the tribe. Thus, we defer comment on the phylogeny and taxonomic status of the included genera and recognize *Beckeriella* as described previously and diagnosed herein.

Genus *Beckeriella* Williston

Beckeriella Williston, 1897:2.

TYPE SPECIES—*Ephydra bispinosa* Thomson, 1868 (= *Scatophaga bispinosa* Fabricius, 1805), monotypy. (Cresson, 1934:201–205 [review]; Wirth, 1968:20 [Neotropical catalog]; Lizarralde de Grosso, 1986:133–137 [species description];

1990:143–146 [species description]; 1991a:39–42 [species description]; 1991b:45–48 [species description]; 1992:229–233 [species description]; 1994:57–59 [species description, Philippines]; Mathis & Zatwarnicki, 1995:27–129 [world catalog]).

DIAGNOSIS—A tribe of the subfamily Gymnomyzinae that is distinguished from other tribes by the following combination of characters: moderately small to large shore flies, length 2.5–5.5 mm.

Head—Frons rectangular, wider than long, vertex at level beyond posterior margin of posterior ocelli; pseudopostocellar setae greatly reduced or lacking; ocellar seta well developed, subequal to outer vertical seta, proclinate, slightly divergent; fronto-orbital seta 2, both proclinate, only anterior setae usually well developed, oriented anterolaterally, posterior seta much smaller or lacking; outer vertical seta well developed; inner vertical seta weakly developed to lacking, if present much smaller than outer seta and with medioproclinate orientation. Scape and pedicel comparatively long and semiporrect; flagellomere 1, comparatively long, greatly elongate and pendulous in some species, apex rounded; pedicel lacking a well-developed dorsoapical seta; flagellum long, bearing 6–12 dorsal rays along length. Face in profile usually concave, sometimes with dorsal half shallowly tumescent, usually with a transverse crease near midheight, usually bare of microtomentum, shiny, bearing a single seta and smaller setulae laterally near margin with parafacial, rarely bearing a 2nd seta ventrad from larger seta. Eye somewhat projected laterally, bulbous, horizontally ovate (bluntly rounded anteriorly in lateral view, more narrowly rounded posterodorsally) or vertically ovate. Anterior oral margin more or less straight; clypeus wide, bandlike, short, partially to mostly concealed by ventral margin of face and gena; genal seta 1, frequently reduced in size.

Thorax—Generally dark-colored; scutellum usually moderately flat, rectangular to trapezoidal, only apical scutellar seta well developed, these sometimes arising from small tubercles; acrostichal setulae minute, usually in 2 rows; only the posteriormost dorsocentral seta well developed, slightly displaced laterally; no presutural or postsutural supra-alar seta; postalar seta 1; pronotum setulose but lacking a large seta; notoplueron usually with 2 setae near ventral margin, posterior seta stronger, anterior seta sometimes lacking; anepisternum bearing 1 large seta along posterior margin; katepisternum bearing 1 large seta and

with anterior $\frac{2}{3}$ usually bare of microtomentum, similar to anteroventral corner of anepisternum, shiny; otherwise pleuron thinly microtomentose. Wing usually infusate, sometimes very dark, to maculate; vein R_{2+3} curved anteriorly at apex rather abruptly, often bearing a subapical stump vein; frequently with some veins sinuous, especially veins R_{2+3} , R_{4+5} , and M. Halter with knob blackish brown. Femora usually brown to black; fore- and especially hind femora sometimes swollen; forefemur bearing numerous long setae along posteroventral surface; midfemur bearing numerous long setae along anteroventral surface; basal tarsomeres yellow, apical 2-3 brownish black.

Abdomen—Strongly convex, domelike, thinly to moderately invested with microtomentum, sometimes more so toward posterior margin, to nearly bare, subshiny to shiny, often with some metallic luster; tergites with lateroventral margins sharply defined, often with cuticular microsculpturing, surface appearing shallowly wrinkled or puckered; 2nd tergite with patch of dorsoerect setulae laterally.

DISTRIBUTION—With the exception of the two species described here and *B. filipina* (from the Philippines), *Beckeriella* is known only from the New World tropics, where the genus currently has its greatest diversity, with 10 species. Many undescribed species are already known and available in collections (Stark, pers. comm.), and undoubtedly numerous others remain to be discovered. Although the shore flies of the Afrotropical Region have not been well collected, we find it somewhat anomalous that the first species of *Beckeriella* were found on Madagascar and not in continental Africa. On Madagascar, the two species were collected at higher elevation, above 1000 m, and from the same province (Antsiranana).

DISCUSSION—*Beckeriella* is apparently of ancient origin and is the only identified genus of shore flies that is represented by fossils in amber (Evenhuis, 1994). The fossils, which are from Dominican amber of unknown provenance, represent a few species and date from the Oligocene/Miocene epochs. Stark (pers. comm.) is now studying and describing these species.

Beckeriella fasciata, new species

Figures 4-1, 4-2a,b

DESCRIPTION—A large shore fly (Fig. 4-1), length 5.2 mm; head generally yellow; thorax and

abdomen black, subshiny to shiny; wing generally dark brown with subapical transverse white band.

Head (Fig. 4-2a)—Generally yellow; mesofrons rectangular, longer than wide, brown; fronto-orbits brown. Inner vertical seta greatly reduced or lacking; fronto-orbital setae 2, posterior seta short, much less than half length of anterior seta, anterior seta slightly longer than outer vertical seta. Scape yellowish brown basally becoming brown apically, length distinctly shorter than pedicel; pedicel brown with some gray microtomentum dorsally; flagellomere 1 dark brown on dorsal half, yellow on ventral half both laterally and medially, length about $2.5\times$ height; flagellomere bearing 11 dorsal rays. Face concave in lateral view, yellow except for wide stripe just ventrad of antennal bases and a thinner stripe at midheight of facial concavity. Eye transversely ovate, anterior margin bluntly rounded, tapered posteriorly to more narrowed posterior margin. Gena yellow, moderately high, gena-to-eye ratio 0.39. Clypeus yellow, wide, short, largely concealed in oral cavity. Mouthparts yellow.

Thorax—Generally black; scutum subshiny, thinly invested with brown microtomentum anteromedially, anterior and anterolateral margins of scutum lightly gray microtomentose, microtomentum becoming sparser and appearing shinier posteriorly until just before posterior margin, which is narrowly but more densely microtomentose, brown; scutellum very sparsely and uniformly brown microtomentose, rectangular (Fig. 4-2b), wider than long, with posterior margin broadly truncate, apical scutellar setae arising from short tubercles at posterolateral corners of scutellum, about as long as length of scutellum; pleuron black, mostly uniformly sparsely microtomentose except for shiny, bare anteroventral corner of anepisternum and anterior $\frac{2}{3}$ of katepisternum. Wing mostly brown, slightly darker basally, with irregular (basal and apical margins) subapical transverse white band at level of apex of vein R_{2+3} and continued posteriorly just apical of crossvein dm-cu; crossvein r-m slightly whitened medially; vein R_{2+3} sinuous, curved sharply toward costa at apex, short, making costal section III as long as section II; vein R_{4+5} sinuous; crossvein dm-cu longer than apex of vein CuA, apical of crossvein dm-cu; costal vein ratio 0.87; M vein ratio 0.60; alula short and wide, fringing setulae as long as alular height; knob of halter blackish brown. Legs mostly brownish black to black, sometimes with shiny surfaces, only foretibia and basal 3 tarsomeres

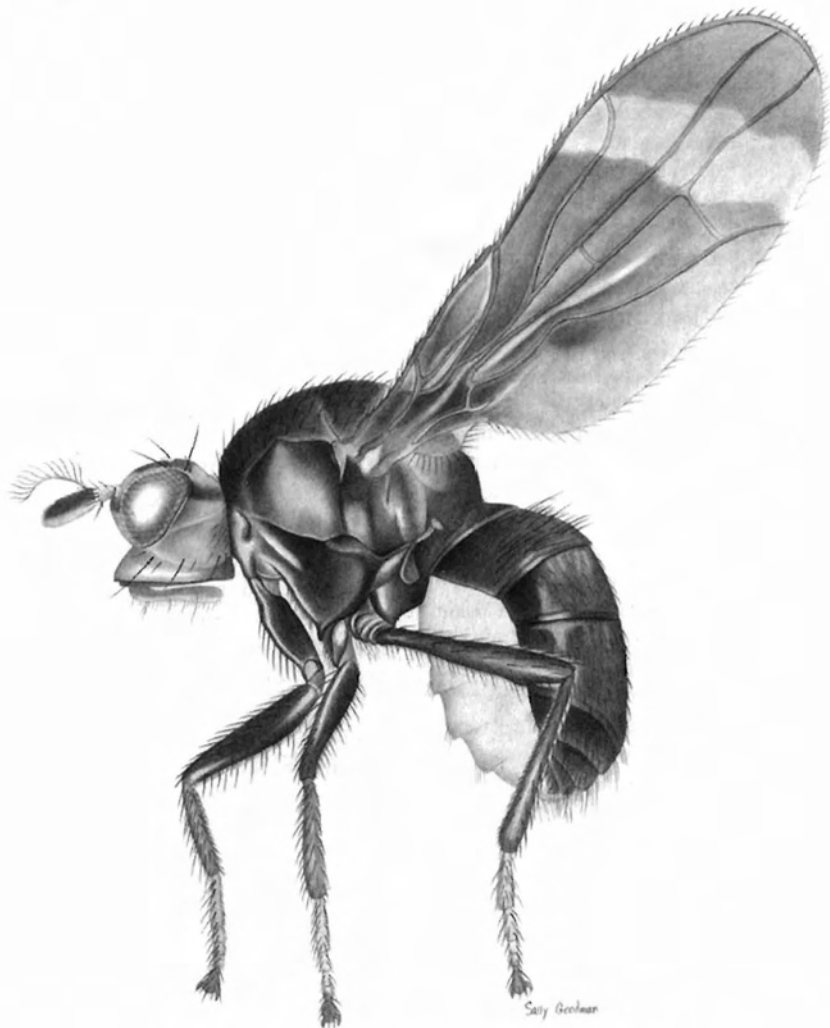


FIG. 4-1. *Beckeriella fasciata*. Habitus, lateral view.

yellow; apices of mid- and hind tibiae brown, slightly lighter in color than femora.

Abdomen—Appearing domelike, generally black, subshiny, thinly microtomentose; 2nd tergite with lateral patches of dorsoerect setae; lateral margins of tergites sharply defined.

TYPE MATERIAL—The holotype female is labeled “Madagascar-Est dct. Sambava R.N. [now Parc National de Marojejy] XII Marojejy-Ouest 1140 m XI-59 [Nov 1959] P.Soga/INSTITUT SCIENTIFIQUE MADAGASCAR [blue; black margin].” The holotype is double-mounted (minuten in rectangular block or pith), is in good condition (right flagellomere 1 missing, left wing torn apically, some tarsi missing, an-

tennae lost soon after illustrating), and is deposited in the Natal Museum (Pietermaritzburg, South Africa).

DISTRIBUTION—Afrotropical: Madagascar (Antsiranana).

ETYMOLOGY—The specific epithet, *fasciata*, refers to the subapical white fascia or band on an otherwise brown to dark brown wing.

DIAGNOSIS—This species is distinguished from congeners, especially *B. maculata*, by its large size (5.2 mm), the largely brown wing with a subapical white transverse band, and its body coloration (see description).

REMARKS—This species is represented by a single female.

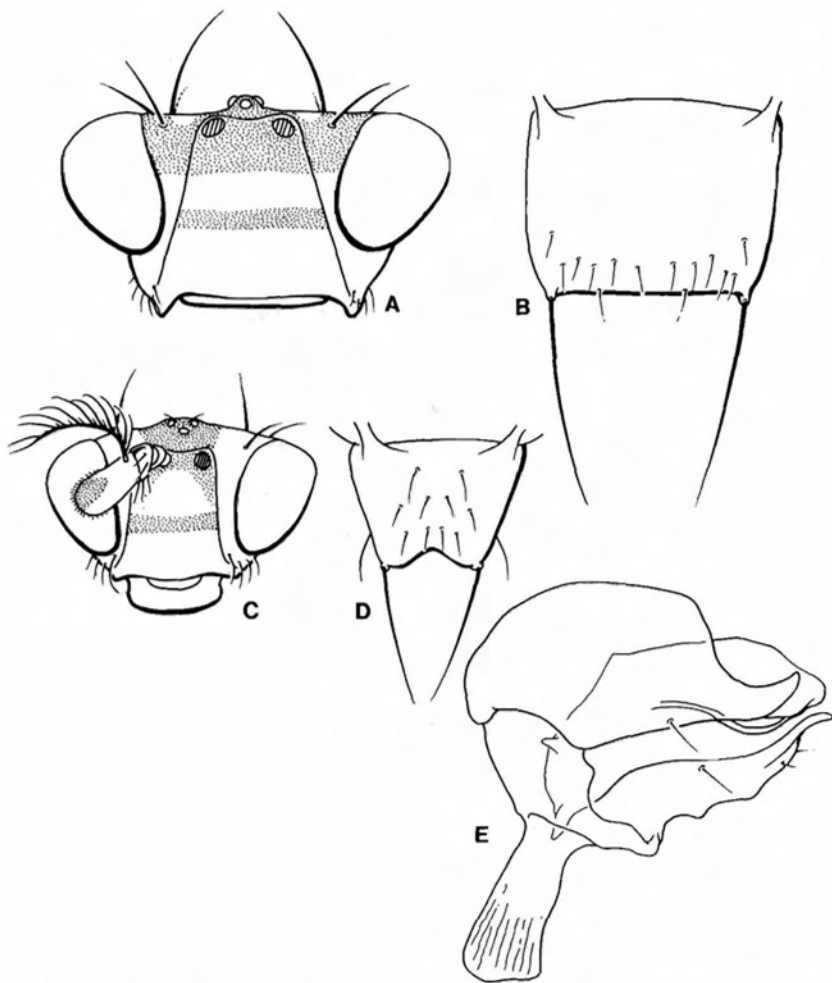


FIG. 4-2. a, b: *Beckeriella fasciata*. a, Head, anterior view. b, Scutellum, dorsal view. c-e: *Beckeriella maculata*. c, Head, anterior view. d, Scutellum, dorsal view. e, Male genitalia, lateral view.

***Beckeriella maculata*, new species**

Figures 4-2c-e, 4-3 to 4-5

DESCRIPTION—Moderately small shore fly, length 2.5–2.70 mm; head generally yellow; thorax and abdomen black, subshiny to shiny; wing generally dark brown on basal half, apical half white with maculate pattern.

Head (Fig. 4-2c)—Generally yellow; mesofrons rectangular, slightly wider than long; fronto-orbits yellow. Inner vertical seta well developed, equal in length to fronto-orbital seta; fronto-orbital setae 2, posterior seta very short, much less than half length of anterior seta, anterior seta slightly longer than outer vertical seta. Scape and pedicel yellow with some grayish microtomentum dorsally; length of scape distinctly shorter than

pedicel; flagellomere 1 mostly yellow, lateral surface with brown stripe extended from anterodorsal corner to base, yellow on dorsal and ventral sides of stripe, median surface with only anterodorsal corner brown, otherwise yellow, length about twice height; flagellomere bearing 9–10 dorsal rays. Face shiny, bare of microtomentum, concave in lateral view with distinct transverse crease at midheight, with a transverse brown stripe at crease, otherwise whitish yellow. Eye transversely ovate, anterior margin bluntly rounded, tapered posteriorly to more narrowed posterior margin. Gena yellow, moderately low, gena-to-eye ratio 0.26–0.30. Clypeus yellow, wide, short, largely concealed in oral cavity. Mouthparts yellow.

Thorax—Generally black; scutum subshiny, anterior and anterolateral margins of scutum light-



FIG. 4-3. *Beckeriella maculata*. Habitus, lateral view.

ly gray microtomentose, posterior half to $\frac{2}{3}$ of scutum mostly with brown microtomentum, with long gray linear spot on median side of dorsocentral track that extends from anterior margin posteriorly for $\frac{2}{3}$ length of scutum and 2 linear spots laterally on either side of transverse suture; scutellum with dorsal surface finely granulose, mostly black with some bluish black reflections, very sparsely brown microtomentose, trapezoidal (Fig. 4-2d), about as long as wide, gradually tapered posteriorly, with posterior margin emarginate me-

dially, apical scutellar setae arising from posterolateral corners, without tubercles at base, subapical scutellar setae about $\frac{1}{3}$ length of apical setae, inserted laterally at apical $\frac{2}{3}$. Wing mostly brown on basal half, dark brown basally, becoming slightly and gradually lighter toward apical half; apical half of wing maculate, mostly hyaline with dark brown irregular spots and zigzag and C-shaped bands; vein R_{2+3} sinuous, curved sharply toward costa at apex, bearing a subapical stump vein that is oriented posteriorly, vein R_{2+3} short,

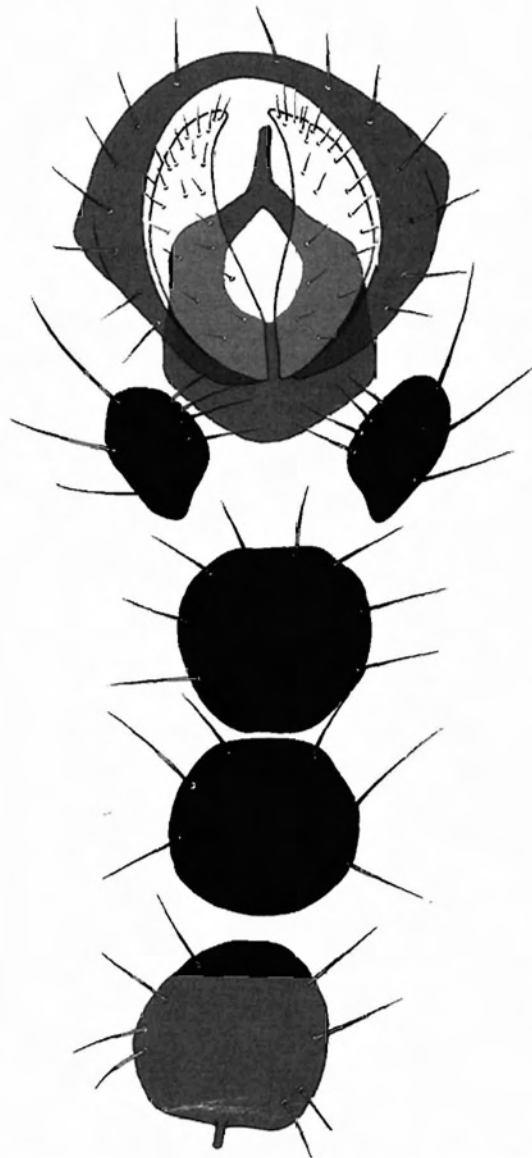


FIG. 4-4. *Beckeriella maculata*. Male terminalia, ventral view, including epandrium, cerci, and sternites 2-5 (5th divided).

making costal section III as long as section II; vein R_{4+5} sinuous; crossvein dm-cu longer than apex of vein CuA_1 , apicad of crossvein dm-cu; costal vein ratio 1.15-1.18; M vein ratio 0.55-0.57; alula short and wide, fringing setulae black, longer than alular height; knob of halter blackish brown. Legs with coxae, trochanters, and femora black; tibiae mostly yellow, with dorsal surfaces of mid- and hind tibiae partially dark brown; basal 3 tarsomeres yellow, apical 2 blackish brown; api-

ces of mid- and hind tibiae brown, slightly lighter in color than femora.

Abdomen—Generally black, subshiny to shiny, with some dark blue reflections; generally sparsely gray microtomentose, especially on anterior $\frac{2}{3}$ of tergites, microtomentum becoming denser submarginally along posterior margin of tergites. Male abdomen (Fig. 4-4): sternites 2-4 rounded, bearing setulae along lateral margins; sternite 2 with small anteromedial papilla; 5th sternite subdivided; epandrium in ventral view widest at midheight, angulate laterally at greatest width; cerci in ventral view subelliptical, medial margin sinuous, wider anteriorly; aedeagus (Fig. 4-2e) tubular; aedeagal apodeme (Fig. 4-2e) with long, narrow keel; granite (Fig. 4-2e) with apex recurved, pointed; hypandrium a somewhat rectangular sclerite with anterior margin shallowly rounded. Female abdomen (Fig. 4-5): Tergites generally wide, 2-4 comparatively long, tergites 5-8 short, 4th with 2 narrow patches of microtomentum toward posterior margin on either side of median; sternites 2-4 subquadrate, angles rounded; sternites 5-7 conspicuously wider than long, width of 7th about $\frac{1}{2}$ 5th, 8th sternite subdivided, each sclerite circular; female ventral receptacle (Fig. 4-5) with operculum bell-shaped, higher than wide, extended process J-shaped, as long as height of operculum.

TYPE MATERIAL—The holotype male is labeled "MADAGASCAR: Antsiranana, Marojejy, 11 km NW Manantenina, X.25-XI.3.1996 1,225 m, E. Quinter." The holotype is double mounted (glued to a paper triangle), is in good condition, and is deposited in the American Museum of Natural History (AMNH). Thirteen paratypes bear the same locality label data as the holotype (9 AMNH, 4 United States National Museum [USNM]). All specimens of the type series were collected in pan traps set at the side of a stream.

DISTRIBUTION—Afrotropical: Madagascar (Antsiranana).

ETYMOLOGY—The specific epithet, *maculata*, refers to the dappled or maculate apical half of the wing.

Key to Malagasy Species of *Beckeriella*

1. Wing mostly brown with irregular subapical transverse white band; scutellum rectangular, wider than long, posterior margin broadly truncate; inner vertical seta greatly reduced, length

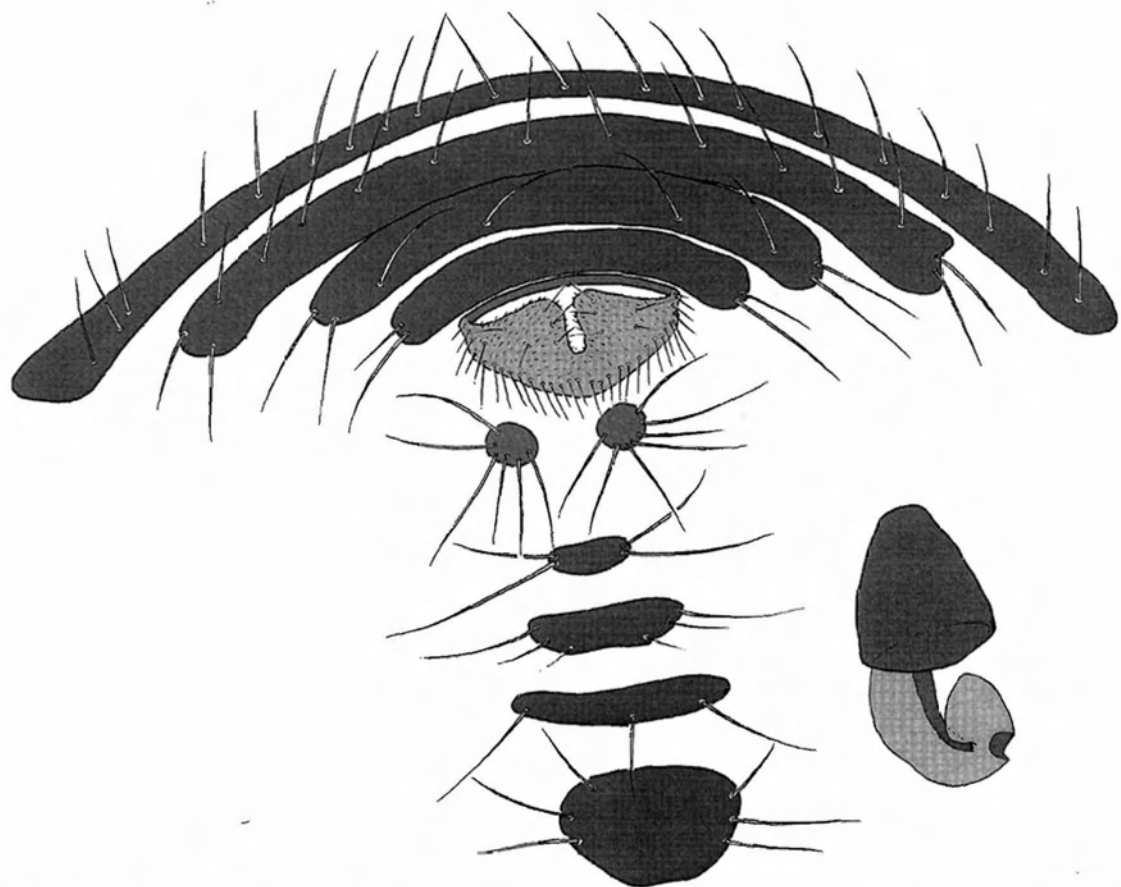


FIG. 4-5. *Beckeriella maculata*. Female terminalia, posterior view, showing apical tergites and sternites, and ventral receptacle, lateral view.

much less than half that of outer vertical seta
 *B. fasciata*, new species

1. Wing with basal half brown and apical half maculate, mostly hyaline with dark brown spots; scutellum trapezoidal, about as long as wide, tapered posteriorly, posterior margin emarginate medially; inner vertical seta well developed, equal in length to fronto-orbital seta *B. maculata*, new species

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AMNH. The holotype of *B. fasciata* was loaned to us by the Natal Museum, Pietermaritzburg, South Africa (David A. Barraclough). Sally Goodman made the habitus illustrations and helped with line drawings. For critically reviewing a draft of this paper, we thank Volker Hollmann-Schirrmacher and Julian Stark.

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