

**COMPARATIVE ANATOMY OF THE FEMALE GENITALIA OF
GENERIC-LEVEL TAXA IN TRIBE AEDINI (DIPTERA: CULICIDAE).
PART XXXVII. GENUS *BIFIDISTYLUS* REINERT,
HARBACH AND KITCHING**

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Abstract. A comparative, morphological analysis of the female genitalia of species included in genus *Bifidistylus* Reinert, Harbach and Kitching was conducted. Treatment of the genital morphology of the genus includes a composite description of the genus, a detailed description and illustration of the type species, *Bf. lamborni* (Edwards), a list of the species examined, a published description of included species with its literature citation, and a discussion. The discussion section contains a list of the most distinctive female genital features of *Bifidistylus*, a comparison of these with other aedine genera, and other pertinent information. The female genitalia of *Bf. boneti kumbae* (Chwatt) also are illustrated.

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INTRODUCTION

This is the thirty-seventh in a series of papers by the author that describe the female genitalia of the generic-level taxa included in tribe Aedini of family Culicidae. Part I of the series (Reinert 2000a) included an introduction to the series, a brief historical background of published papers dealing with the subject, preparation techniques and anatomical terminology, part II (Reinert 2000b) dealt with genus *Psorophora* Robineau-Desvoidy, part III (Reinert 2000c) with genus *Udaya* Thurman, part IV (Reinert 2000d) with genus *Zeugomyia* Leicester, part V (Reinert 2000e) with genus *Aedes* Meigen, part VI (Reinert 2001a) with genus *Ayurakitia* Thurman, part VII (Reinert 2001b) with genus *Opifex* Hutton, part VIII (Reinert 2001c) with genus *Verrallina* Theobald, part IX (Reinert 2001d) with genus *Eretmapodites* Theobald, part X (Reinert 2002a) with genus *Heizmannia* Ludlow, part XI (Reinert 2002b) with genus *Haemagogus* Williston, part XII (Reinert 2002c) with genus *Armigeres* Theobald, part XIII (Reinert 2002d) with genus *Ochlerotatus* Lynch Arribalzaga, part XIV (Reinert 2002e) provided a key to genera recognized at that time, part XV (Reinert 2008a) with genus *Georgecraigius* Reinert, Harbach and Kitching, part XVI (Reinert 2008b) with genus *Phagomyia* Theobald, part XVII (Reinert 2008c) with genus *Dahlia* Reinert, Harbach and Kitching, part XVIII (Reinert 2008d) with genus *Hulecoeteomyia* Theobald, part XIX (Reinert 2008e) with genus *Danielsia* Theobald, part XX (Reinert 2008f) with genus *Rampamyia* Reinert, Harbach and Kitching, part XXI (Reinert 2008g) with genus *Patmarksia* Reinert, Harbach and Kitching, part XXII (Reinert 2008h) with genus *Downsiomyia* Vargas, part XXIII (Reinert 2008i) with genus *Tanakaius* Reinert, Harbach and Kitching, part XXIV (Reinert 2008j) with genus *Vansomerenis* Reinert, Harbach and Kitching, part XXV (Reinert 2008k) with genus *Dobroworskyius* Reinert, Harbach and Kitching, part XXVI (Reinert 2008l) with genus *Collessius* Reinert, Harbach and Kitching, part XXVII (Reinert 2009a) with genus *Hopkinsius* Reinert, Harbach and Kitching, part XXVIII (Reinert 2009b) with genus *Luius* Reinert, Harbach and Kitching, part XXIX (Reinert 2009c) with genus *Jihlienius* Reinert, Harbach and Kitching, part XXX (Reinert 2009d) with genus *Gilesius* Reinert, Harbach and Kitching, part XXXI (Reinert 2010a) with genus *Sallumia* Reinert, Harbach and Kitching, part XXXII (Reinert 2010b) with genus *Jarnellius* Reinert, Harbach and Kitching, part XXXIII (Reinert 2010c) with genus *Lewnielsenius* Reinert, Harbach and Kitching, part XXXIV (Reinert 2010d) with genus *Catageomyia* Theobald, part XXXV (Reinert 2010e) with genus *Elpeytonius* Reinert, Harbach and Kitching, and part XXXVI (Reinert 2010f) with genus *Polyleptomyia* Theobald. Reinert et al. (2004, 2006, 2008 and 2009) conducted phylogenetic analyses of tribe Aedini and revised the classification of generic-level taxa. This paper covers the female genitalia of genus *Bifidistylus* Reinert, Harbach and Kitching, which was described by Reinert et al. (2009).

A comparative, morphological analysis of the female genitalia of *Bifidistylus* was conducted, a characterization is given, and a discussion including a comparison with other aedine taxa is provided. The format used includes a composite description, a description and illustration of the type species, *Bf. lamborni* (Edwards), a list of the species examined, a published description of species with its literature citation, and a discussion including the most distinctive features and other pertinent information. The female genitalia of *Bf. boneti kumbae* (Chwatt) also are illustrated.

MATERIALS AND METHODS

Female genitalia of genus *Bifidistylus* are considered here to include all structures caudad of abdominal segment VII. Segment VIII is included since its tergum and sternum are often modified in development and shape, and possess specialized setae.

Terminology used in the descriptions and illustrations follows Reinert (2000a, 2008a) and the abbreviations used are found in the "List of Abbreviations Used in the Text and/or Figures" that precedes the figures. The morphological description is based on slide-mounted genitalia that were dissected from dead, dried females. Measurements and descriptions of female genital structures are based on specimens that were cleared, dissected, arranged in a dorsoventrally flattened position, and mounted in Canada balsam under glass cover slips on microscope slides. Ranges are based on the species (listed under "species examined" section) and specimens that I have examined, therefore some variation may occur in species not seen. A phase contrast microscope was used because this was usually necessary to determine some structures, e.g., spermathecal eminence on the roof of the vagina. Measurements of structures (e.g., length and width of terga VIII and IX, sternum VIII, cercus, etc.) include only the pigmented and sclerotized areas and were visible at 400X magnification. Measurements were made using an ocular micrometer having a linear scale of 100 divisions that had been calibrated using a stage micrometer. The scale used in the illustration is in millimeters.

The method of preparation of specimens followed Reinert (2000a). During dissection of the genitalia, extra care was taken when separating the insula and lower vaginal lip from sternum VIII as the insula often breaks off and remains attached to the apical intersegmental membrane of the sternum. To avoid this, the intersegmental membrane of sternum VIII can be separated from the apical margin of the sternum and mounted with the insula and lower vaginal lip.

FEMALE GENITALIA OF GENUS *BIFIDISTYLUS* REINERT, HARBACH AND KITCHING

Genus description. *Segments VII and VIII.* Dorsoventrally flattened; intersegmental membrane between VII-Te and VIII-Te relatively long. *Tergum VIII.* Width greater than length; covered with minute spicules; moderately pigmented; base slightly concave mesally; apex straight, with several relatively long and few short, relatively straight setae; setae on distal 0.36-0.47; basolateral seta present or absent; numerous broad scales on distal 0.71-0.80; VIII-Te index 0.54-0.64; VIII-Te/IX-Te index 1.98-2.73; length 0.29-0.36 mm; width 0.49-0.62 mm. *Sternum VIII.* Width greater than length; covered with minute spicules; moderately pigmented with distal area heavily pigmented mesally; base gently concave on median area; apex with moderate, median emargination separating somewhat flattened, broadly rounded lobes, with numerous short, slightly curved setae; several moderately long and short setae on distal 0.77-0.82; seta 1-S inserted relatively moderate distance from basal margin; seta 2-S inserted posterior and slightly lateral to seta 1-S; basolateral seta present or absent; numerous broad scales on distal 0.80-0.86; VIII-S index 0.64-0.73; length 0.38-0.46 mm; width 0.55-0.63 mm. *Tergum IX.* Moderately long; moderately wide; covered with minute spicules; comprised of 2 moderately pigmented, lateral sclerites connected mesally by membrane and narrow, basal, somewhat lightly pigmented strip; apex with 2 rounded lobes each with 5-14 short, slender setae; 11-27 total setae; dorsal spheres present; IX-Te width/length ratio 1.06-1.29; length 0.13-0.15 mm; width 0.16-0.17 mm. *Insula.* Tonguelike; covered with minute to short spicules; setae and tuberculi absent. *Lower vaginal lip.* Covered with minute to short spicules; lightly to moderately pigmented; narrow; hinge relatively

narrow; without lower vaginal sclerite; ventral tuft present, small. *Upper vaginal lip*. Covered with minute to short spicules; heavily pigmented; narrow laterally and curved outward, caudal part narrow with posterior margin relatively straight; upper vaginal sclerite moderately pigmented, moderately large. *Spermathecal eminence*. Membranous; ill-defined; with minute spicules. *Postgenital lobe*. Covered with short spicules; moderately long; moderately wide; moderately pigmented with distal area somewhat darker; apex with small to moderate, median emargination; basal mesal apodeme short, somewhat oblong, moderately pigmented; setae on distal 0.29-0.36 of ventral surface; PGL ventral index 1.38-1.56; PGL ventral width/Ce dorsal width ratio 0.88-0.99. *Proctiger*. Membranous; with minute spicules in short rows. *Cercus*. Covered with minute to short spicules; moderately long; moderately wide throughout most of length; apex broadly rounded, with few short and few moderately long setae; setae on distal 0.67-0.92 of dorsal surface; dorsal surface with several broad scales on approximately proximal half (*Bf. lamborni*) or absent (*Bf. boneti kumbae*); cercus index 1.92-2.03; Ce/dorsal PGL index 2.14-3.00; length 0.20-0.22 mm; width 0.10-0.11 mm. *Spermathecal capsules*. One large and 2 slightly smaller ones; heavily pigmented; spherical; with several small, spermathecal capsule pores near orifice, more numerous on larger capsule. *Accessory gland duct*. Basal area narrow, darkly pigmented, moderately long.

Type species description (*Bf. lamborni*, Figure 1). *Tergum VIII*. Setae on distal 0.37-0.47; basolateral seta absent; VIII-Te index 0.54-0.64; VIII-Te/IX-Te index 1.98-2.30; length 0.29-0.32 mm; width 0.49-0.55 mm. *Sternum VIII*. Setae on distal 0.77-0.82; basolateral seta absent; scales on distal 0.74-0.86; VIII-S index 0.64-0.71; length 0.38-0.39 mm; width 0.55-0.59 mm. *Tergum IX*. Each apical lobe with 5-10 setae; 11-20 total setae; IX-Te width/length ratio 1.06-1.19; length 0.13-0.15 mm; width 0.16 mm. *Postgenital lobe*. Setae on distal 0.29-0.34 of ventral surface; PGL ventral index 1.38-1.56. *Cercus*. Setae on distal 0.78-0.92 of dorsal surface; scales on approximately proximal half of dorsal surface; cercus index 1.92-2.03; Ce/dorsal PGL index 2.14-3.00; length 0.20 mm.

Species examined. *Bifidistylus boneti kumbae* and *Bf. lamborni*.

Discussion. The following combination of features is most distinctive for the female genitalia of species belonging to genus *Bifidistylus*. Insula is tongue-like and without setae or tuberculi. The cercus is moderately long, moderately wide throughout its length, the apex is broadly rounded, and the dorsal surface has setae on the distal 0.67-0.91. The postgenital lobe is moderately long, moderately wide, distal area darker pigmented, the apex has a small to moderately deep, median emargination. Sternum VIII is mostly covered with broad scales, the width is greater than the length, the apex has a moderately deep, median emargination separating somewhat flattened, broadly rounded lobes each bearing numerous short, slightly curved setae, and the distal area is darkly pigmented. Tergum VIII has numerous scales on the distal 0.71-0.80, the width is greater than the length, the apex is straight with several relatively long and few shorter setae, and the base is slightly concave mesally.

Female genitalia of *Bifidistylus* bear some similarity to some other aedine genera with a tongue-like insula without setae and with one large and two slightly smaller spermathecal capsules. They are similar to species of genus *Elpeytonius* in the darker pigmented distal parts of sternum VIII and postgenital lobe, but are easily separated from these by the presence of numerous scales on both tergum VIII and sternum VIII, tergum IX is differently developed, cercus is shorter, broader and with apex broadly rounded, and the presence of only a single large spermathecal capsule.

Reinert et al. (2009) provided a brief description of the female genitalia of *Bifidistylus* and a description of all known life stages of the genus. Female genitalia of *Bf. boneti kumbae* are also illustrated (Figure 2).

Published description of female genitalia. *Bifidistylus lamborni*: Reinert et al. (2009).

ACKNOWLEDGMENTS

Appreciation is expressed to Kenneth J. Linthicum and Gary G. Clark (CMAVE) for providing facilities to complete this study; to Ralph E. Harbach (The Natural History Museum (NHM), London, United Kingdom) and Graham B. White (Department of Entomology and Nematology, University of Florida, Gainesville, FL) for reviewing the manuscript; to Taina R. Litwak (Litwak Illustration Studio, Darnestown, MD) for preparing the illustration; and to James E. Pecor and Thomas V. Gaffigan (WRBU) and Theresa M. Howard (NHM) for the loan of specimens.

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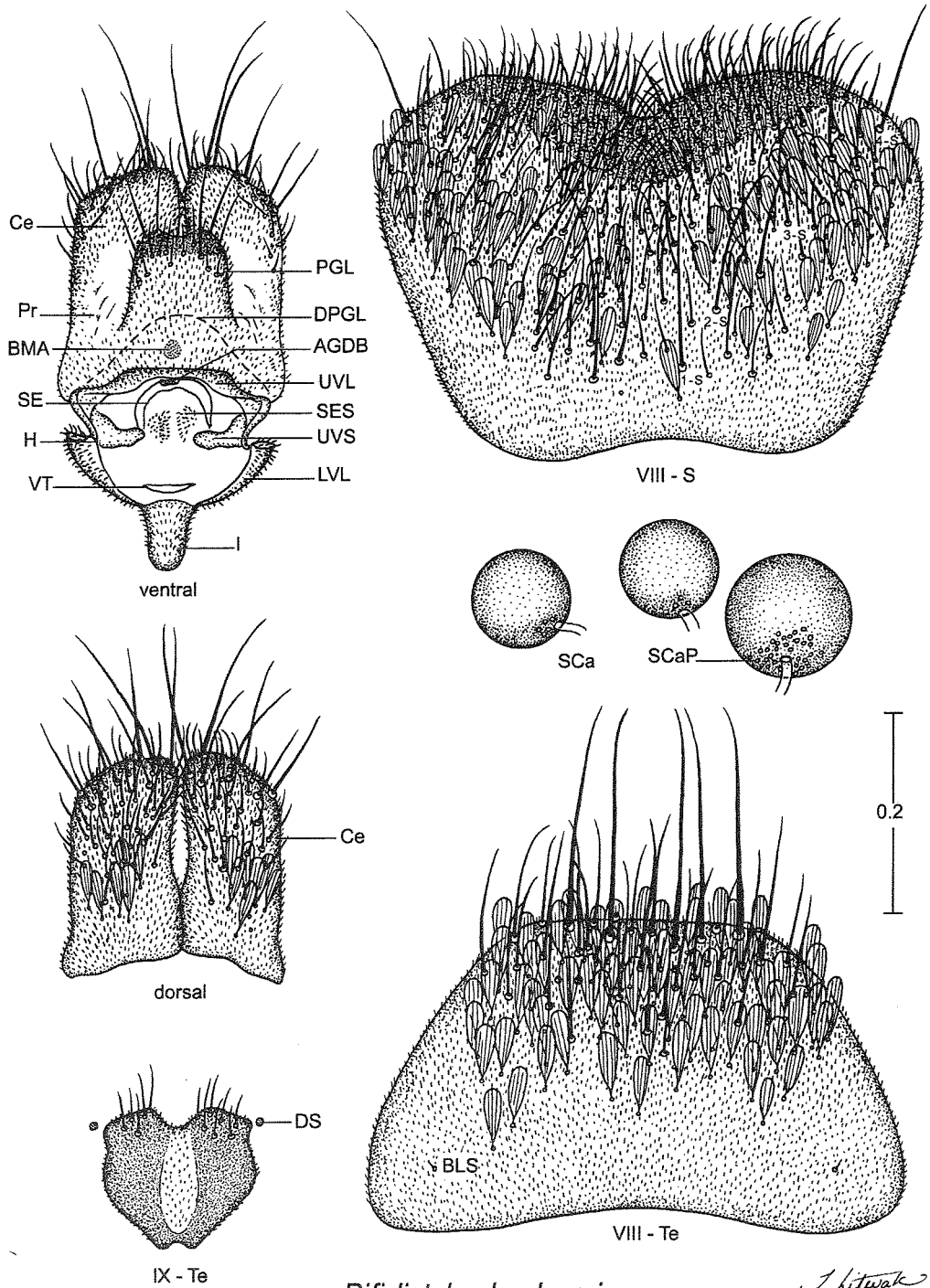
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FIGURE 1. FEMALE GENITALIA OF *BIFIDISTYLUS LAMBORNI***FIGURE 2. FEMALE GENITALIA OF *BIFIDISTYLUS BONETI KUMBAE*****LIST OF ABBREVIATIONS USED IN THE TEXT AND/OR FIGURES**

AGDB	= accessory gland duct base
BLS	= basolateral seta
BMA	= basal mesal apodeme
Ce	= cercus
DPGL	= line of attachment of Pr to dorsal surface of PGL
DS	= dorsal sphere
H	= hinge
I	= insula
IX-Te	= tergum IX
LVL	= lower vaginal lip
mm	= millimeter
PGL	= postgenital lobe
Pr	= proctiger
SCa	= spermathecal capsule
SCaP	= spermathecal capsule pore
SE	= spermathecal eminence
SES	= spermathecal eminence spicule
UVL	= upper vaginal lip
UVS	= upper vaginal sclerite
VIII-S	= sternum VIII
VIII-Te	= tergum VIII
VT	= ventral tuft
1-5-S	= setae 1-5-S

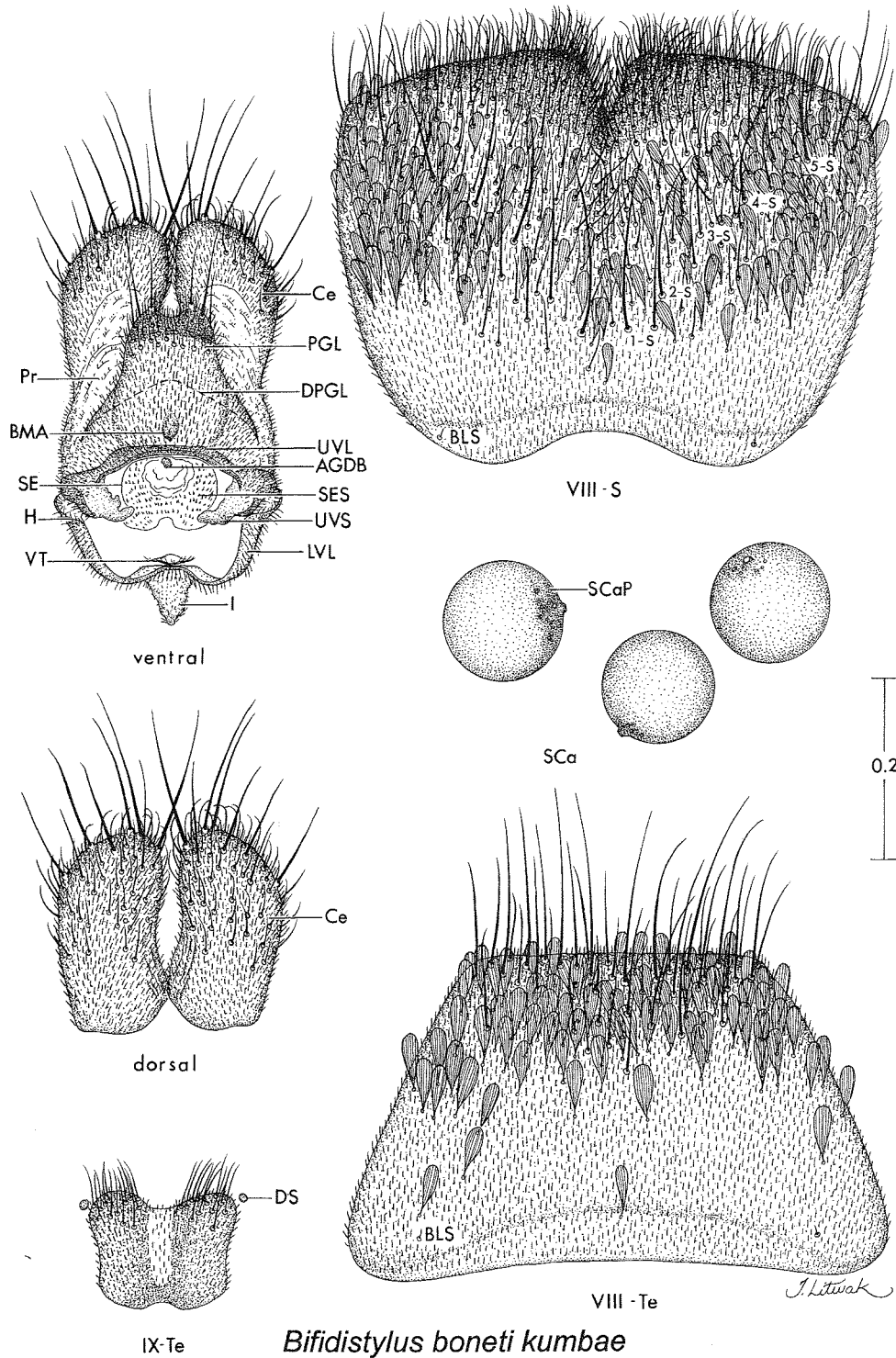
Fig. 1



Bifidistylus lamborni

J. Kiteyak

Fig. 2



SYSTEMATIC INDEX

Valid generic and specific taxa are italicized, other taxa are in Roman type. Boldface page numbers are those which began the primary treatment of the taxon.

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