

## ***Distostylus* gen. nov., a monotypic therevine genus (Diptera: Asiloidea: Therevidae) from the Caribbean Island of Dominica**

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### **Abstract**

A new monotypic genus, *Distostylus* Webb (Diptera: Therevidae), based on a new species, *irwini* Webb, is described from specimens collected on the Caribbean island of Dominica. An hypothesis of the placement of the new taxon is generated based on a matrix of 30 morphological characters. This genus is associated with the *Lindneria* genus group and shows some affinities to the amber fossil species *Ambradolon grimaldii* Metz & Irwin.

**Key words:** genus description, species description, phylogeny, distribution

### **Introduction**

A recent collecting effort on the Caribbean island of Dominica has resulted in the discovery of a new species of Therevinae (Diptera: Asiloidea: Therevidae). The New World therevid species remain one of the more poorly studied and speciose groups among the family and the complete intergeneric phylogeny awaits further elucidation.

This new species shares putative synapomorphies put forth by Metz and Irwin (2000) for the group of therevine species closely related to those in the genus *Lindneria* Kröber. These included the lack of setae on the metanepisternum and the absence of setae on the posterolateral surface of the midcoxae, but most notably is the presence of a slender inner gonocoxal process. The state of setae on the posterolateral surface of the midcoxae has been used historically and extensively to delimit therevid taxa. The remaining New World therevine taxa that lack these setae are part of the tribe Cyclotelini (Gaimari & Irwin 2000). The Cyclotelini are strongly characterized by the fusion of the gonocoxites in the male and by the presence of a furcal bulla in the female, thus excluding the new species from Dominica.

The informal *Lindneria* genus group was supported by cladistic analysis (Metz & Irwin 2000) promoting the description of two new genera composed of species restricted to the Caribbean, one from Dominican Republic amber. The *Lindneria* genus group includes *Lindneria*, *Insulatitan* Metz & Irwin, *Ambradolon* Metz & Irwin, and *Penniverpa* Irwin & Lyneborg. The authors (Metz & Irwin 2000) provided a key to the genera and species, but the recently collected specimens from Dominica are indeterminable to any currently described genera. The current research includes a cladistic analysis to place the undescribed species from Dominica and to make the species known to science.

## Methods

General morphology follows Webb and Irwin (1999) and McAlpine (1981) with additional terminology from Irwin and Lyneborg (1981a, b). Some structures of the male genitalia follow terminology from Winterton et al. (1999a). Terminology for structures of the female terminalia follows Irwin (1976) as modified by Winterton et al. (1999a, b) and Lyneborg (2001). Variation in body length is given as a range, followed by the mean. Setae described as elongate have a length equal to or greater than the width of the scape; those described as short have a length less than the width of the scape. Macrosetae on the thorax (np = notopleural, sa = supraalar, pa = postalar, dc = dorsocentral, sc = scutellar) were counted from the left half of the specimen. Anteroventral (av) and posteroventral (pv) macrosetae for the fore, mid, and hind femora are represented in the text as counts (0:0:0). Each specimen was given a unique specimen code on a yellow label in the format THER-EVIDAE/M. E. Irwin/Specimen #/999999. These codes facilitate entry and manipulation of data into a systematic database within the architecture of MANDALA (Kampmeier et al. 1998) and are recorded as "MEI 999999" with their associated specimens throughout the text. All material examined is listed after the description and the depository site is given in ( ) after the MEI specimen number. The following institutions were kind enough to loan material relevant to this study or are depositories for specimens: California Academy of Sciences (CAS), Clemson University (CUAC); Illinois Natural History Survey (INHS); M. E. Irwin collection (MEI); United States National Museum (USNM).

## Cladistic analysis and classification

The new species from Dominica was placed in a modified matrix from Metz & Irwin (2000) composed of nine taxa and 30 characters (Appendix 1) for which brief character and state descriptions are listed (Appendix 2). Each ingroup genus was represented by the type species and *Insulatitan* is represented by two species representing the two species groups, one with holoptic males and the other with dichoptic males. *Lindneria wintertoni* Metz & Irwin is used instead of the type species of *Lindneria* because the type species, *L.*

*splendida* Kröber, is only known from males. The data was analyzed with PAUP\* (Swoford 2001) using an exhaustive search (“alltrees”) and the default search settings. Successive reweighting was performed to increase resolution based on weights from the rescaled consistency index (“reweight”) with subsequent exhaustive searches until the tree length stabilized. Character changes were mapped on the tree hypothesis using Winclada (Nixon 1999) and unambiguous character optimization.

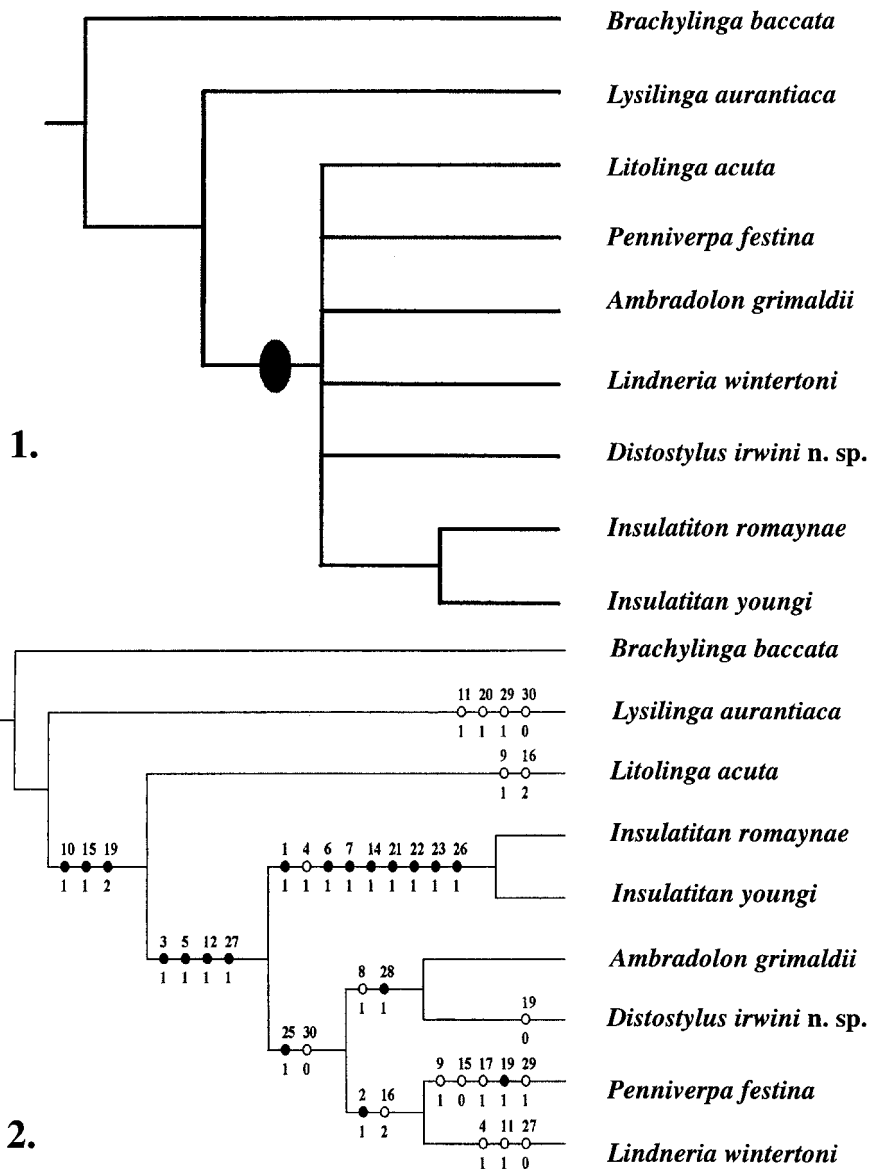
The first exhaustive search produced four shortest trees of 56 steps (CI = 0.66, HI = 0.38). The consensus of these trees (Fig. 1) supports the resolution of the original *Lindneria* genus group with respect to the outgroup taxa, *Brachylinga baccata* (Coquillett) and *Lysilinga aurantiaca* (Coquillett), with the new species from Dominica part of the monophyletic *Lindneria* genus group. The successively reweighted tree (Fig. 2; CI = 0.85, HI = 0.16), obtained after two repetitions of successive reweighting, supports a sister group relationship between the new species and *Ambradolon grimaldii* Metz & Irwin represented by one male specimen from Dominican Republic amber (Oligocene-Miocene fossil).

The new species shares the absence of depressions on the female frons adjacent to the eyes (Character 5, State 1), the absence of setae on the metanepisternum (Character 10, State 1), the absence of setae on the posterolateral surface of the midcoxae (Character 12, State 1), and a relatively long dorsal apodeme (Character 15, State 1) with the *Lindneria* genus group of species and shares with *Ambradolon* the presence of dorsocentral macrosetae (Character 8, State 1) and the presence of a fused, but obvious inner gonocoxal process (Character 28, State 1). The new species differs from *Ambradolon* by retaining a simple posterior margin of the epandrium (Character 19, State 0) and by the unique morphology of the gonostylus (autapomorphic and not represented in the cladistic matrix). *Ambradolon* is represented by one specimen and, because it is a fossil embedded in amber, is only scored in the matrix for 10 of the 30 characters, thus contributing to the lack of resolution in the initial exhaustive search. Removal of *Ambradolon* from the matrix results in a single most parsimonious tree with the new species as the sister of *Penniverpa* + *Lindneria*. Although the placement of the new species among the *Lindneria* group genera is well supported, the sister group relationship between the new species and *Ambradolon* is not very well supported by the cladistic analyses and, in conjunction with observed differences in their morphologies, is not considered strong evidence for the inclusion of the new species in the fossil genus. Likewise, the new species does not share any of the known synapomorphies for the extant *Lindneria* group genera. We therefore take the conservative approach and describe a new monotypic genus unlike those already described.

The key for the *Lindneria* group genera (Metz & Irwin 2000) is sufficient for determining specimens of the new species with the following modification of couplet four.

- 4 Scutum with 2 pairs of dorsocentral macrosetae..... 4.1  
 - Dorsocentral macrosetae absent ..... 5  
 4.1 Cell  $m_3$  closed and petiolate at wing margin. Posterolateral corners of epandrium

- extended and strongly flanged. Apicoventral gonostylus smoothly curving dorsally ....  
..... *Ambradolon grimaldii* Metz & Irwin
- Cell  $m_3$  open at wing margin. Posterolateral corners of epandrium truncate and only  
weakly flanged (Fig. 3). Apicoventral area of gonostylus enlarged, bulbous (Fig. 8)....  
..... *Distostylus irwini* spec. nov.



**FIGURES 1-2.** 1, Strict consensus of four shortest trees from initial exhaustive search. See text for tree statistics. Ellipse indicates the node of the *Lindneria* genus group. 2, Single tree resulting from successive reweighting. See text for tree statistics. Characters are mapped with the character number above and the character state below each hash mark. Solid hash marks indicate forward changes with no homoplasy, unfilled hash marks indicate forward homoplasious changes or reversals. See Appendix 2 for character and state descriptions.

Type species *Distostylus irwini* Webb spec. nov. by present designation.

**Etymology.** *disto-* (Latin) = stand apart, differ + *stilus* (incorrectly *stylus*) (Latin, masculine) = stiletto, stylet. Used as a noun in apposition and referring to the rather unique morphology of the gonostylus with its crablike shape and ventrally produced, heavily setose lobe.

### Diagnosis

**Head.** Ocellar tubercle slightly raised above level of vertex. Eyes reddish brown, ommatidia size homogenous, median margin sinuate; males holoptic, females dichoptic. Frons lacking setae lateral to antennal base. Face slightly projecting beyond eyes. Antenna shorter than head length; scape cylindrical, over twice as long as wide, width narrower than flagellum, macrosetae dark reddish brown; pedicel lobate, approximately one-half length of scape; flagellum with three flagellomeres, approximately three times longer than wide, and over 1.5 times length of scape. Parafacial covered with gray pruinescence; setae absent. Maxillary palpus cylindrical, apex rounded, approximately 6 times longer than wide. Genal setae white, elongate. Occiput convex, with dense gray pruinescence; setae white, elongate ventrally, becoming pale whitish gold lanceolate, appressed dorsally along margin of eye; macrosetae black, a few scattered laterally. Postocular macrosetae black, in single row across vertex then extending ventrally.

**Thorax.** Prosteronum with white elongate setae. Pleura with setae absent on proepimeron, notopleural shelf, anepimeron, meron, metanepisternum, and posterior basalare. *Wing.* Setulae absent on R<sub>1</sub>. Cell m<sub>3</sub> open widely, cell cup closed. *Legs.* Metakatepisternum lacking setae. Coxae with setae absent on posterior half of midcoxa; hind coxa with papillate projection; apical macrosetae dark brown.

**Male terminalia.** Tergite 8 (Fig. 3) bilobed, anterior margin broadly concave; posterior margin deeply emarginate; one pair of sensory setae. Epandrium in dorsal view (Fig. 3) quadrate, shorter medially than wide; anterior margin deeply emarginate; posterolateral corners shortly extended posteriorly, broadly pointed, with narrow glabrous margin; in lateral view quadrate tapered posteriorly to posteroventral point. Hypandrium (Figs. 5-6) heavily sclerotized; free floating in membrane between halves of gonocoxite. Gonocoxite (Figs. 5-6) separated medially; gonocoxal apodeme extended anteriorly beyond anterior margin of gonocoxite, inner gonocoxal process fused to dorsal surface of outer gonocoxal process; ventral lobe (Fig. 5) large, flattened laterally, not curved around base of gonostylus. Distiphallus in dorsal view (Fig. 9) slightly expanded laterally at subapex; in lateral view (Fig. 11) elongate, decurved ventrally. Ejaculatory apodeme dorsal view (Fig. 9) with posterior half bulbous. Lateral ejaculatory processes (Figs. 9-10) large, heavily sclerotized, circular, separated medially into lateral halves. **Female terminalia.** Sternite 8 in ventral

view (Fig. 12) quadrate, tapered posteriorly to sharp point, anterior margin rounded, sides parallel; penal guide present. Median lobe of tergite 9 glossy, setae absent. Furca (Fig. 13) lacking posteromedial, anteromedial, and anterolateral projections. Internally with two spermathecae and a central spermathecal sac.

***Distostylus irwini* spec. nov. Webb**

**Etymology.** Named in honor of the therevidologist and collector of the specimens, Dr. Michael E. Irwin and used as a noun in apposition.

**Description of male holotype** (MEI 146471). Length 5.7 mm.

**Head.** Length 0.68 mm. Ocellar tubercle dark reddish brown, pruinescence gray; setae black, short. Eyes reddish brown, contiguous medially. Frons yellowish gray, becoming dark brown when specimen rotated clockwise; setae dark brown, short. Antenna 0.91 times length of head; dark brown, scape with dense gray pruinescence; scape length 0.21 mm, width 0.10 mm, 2.1 times longer than wide, 3.5 times length of pedicel, 0.8 times width of flagellum, setae dark reddish brown, grading into macrosetae; pedicel length 0.06 mm, width 0.08 mm, setae dark reddish brown, short; first flagellomere length 0.25 mm, 0.12 mm wide, second flagellomere length 0.04 mm, 0.03 mm wide, third flagellomere tapered posteriorly, length 0.06 mm, width 0.03 mm; flagellum length 0.35 mm, 2.9 times longer than wide, 1.7 times length of scape. Maxillary palpus dark reddish brown, pruinescence gray, length 0.38 mm, width 0.06 mm, 6.3 times longer than wide; setae pale yellow, elongate.

**Thorax.** Mesonotum dull brown in ground color, pruinescence dull greenish gray anteriorly; dorsocentral and lateral vittae dull brown; setae black, elongate, with scattered brownish gold setae laterally and pale iridescent turquoise lanceolate appressed setae. Pleura and scutellum dark brown, pruinescence dull gray; setae white, elongate on propleuron and dorsoanterior half of katepisternum, pale iridescent turquoise lanceolate setae on anepisternum and scutellum, whitish brown filiform setae on laterotergite. *Wing.* Membrane opaque, costal and subcostal veins dark yellow, other veins brown; length 4.7 mm, width 1.7 mm, 2.7 times longer than wide; pterostigma dark brown. Halter dark brown. *Legs.* Coxae dark brown, pruinescence gray; setae white. Femora dark brown, pruinescence gray; setae white, elongate, filiform on ventral half of fore femur, with mixture of pale brown and iridescent turquoise lanceolate, appressed setae on dorsal surface; 4:4:7 av, 0:0:3 pv. Tibiae and tarsi dark brown.

**Abdomen.** Dark reddish brown with gray pruinescence across posterior margin of tergite 1, a broad lateral pruinescent triangle on tergites 2-6 which extends across posterior margin of tergites, narrow on tergite 2 but increasing in width to tergite 6; tergite 7 covered with gray pruinescence; dorsal setae dark brown appressed on dark brown areas of tergites, white appressed on pruinescent areas of tergites, lateral setae white. *Terminalia* (paratype

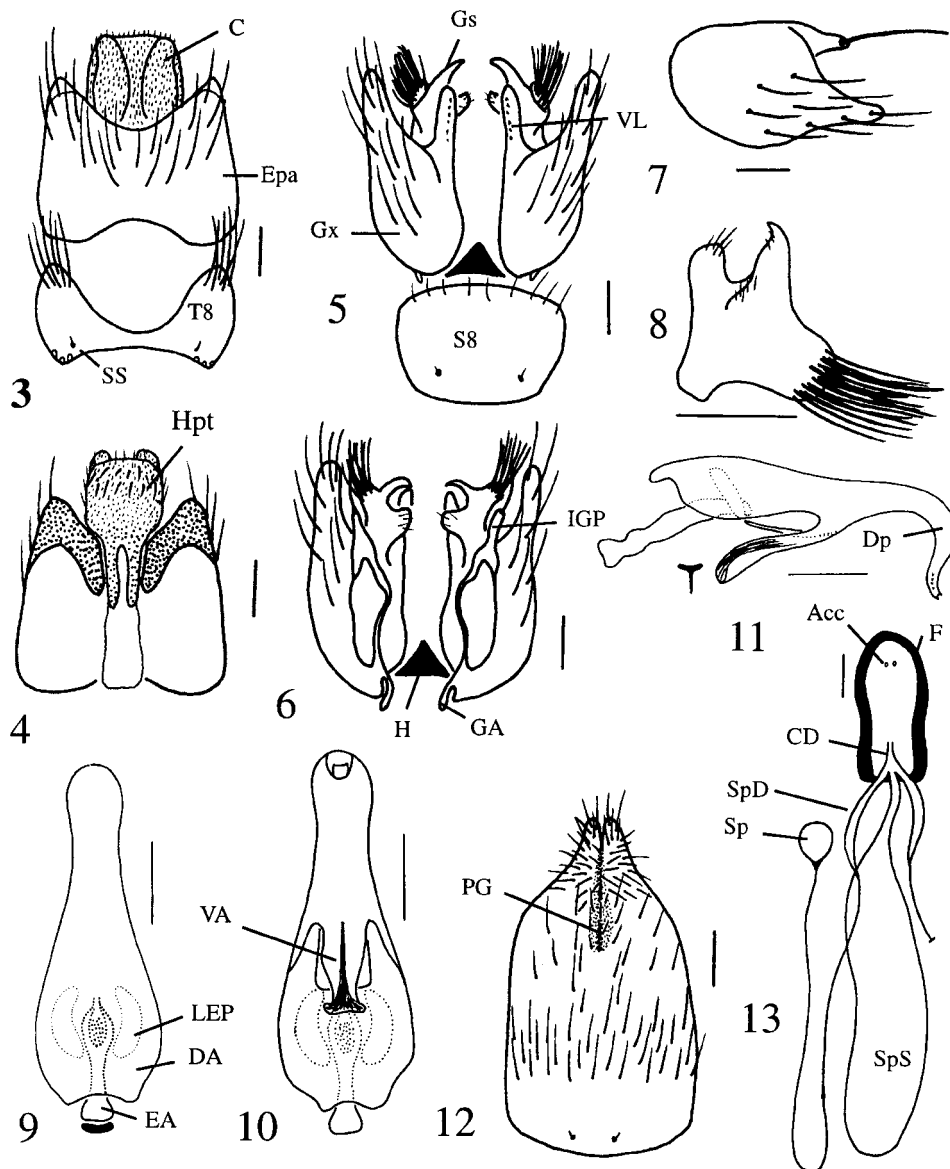
MEI 146969). Dark reddish brown. Tergite 8 (Fig. 3) with setae dark yellow, scattered on lateral lobes. Sternite 8 (Fig. 5) with anterior margin slightly rounded, posterior margin truncate; setae along posterolateral margin dark yellow, short. Epandrium (Fig. 3) quadrate, posterolateral corners with narrow glabrous margin; setae dark brown. Cercus (Fig. 3) oval, ending distal to apex of epandrium and above apex of hypoproct. Hypoproct (Fig. 3) quadrate, posterior margin truncate, ending distal to apex of epandrium and below apex of cercus; ventral surface quadrate (Fig. 4), extending anteriorly as two narrow sclerotized projections, then continuing as lightly sclerotized membrane; posterior area with several thick setae. Gonocoxite ventral view (Fig. 5) with basal two-thirds quadrate, slightly rounded laterally, then tapering posteriorly to broad outer gonocoxal process; dorsal view (Fig. 6) with inner gonocoxal process short, narrow with a single apical dark brown setae; lateral view (Fig. 7) broadly tapered posteriorly, outer gonocoxal process ending distal to inner gonocoxal process; setae dark brown; ventral lobe (Fig. 5) with several short spines on ventral surface. Gonostylus in lateral view (Fig. 8) uniquely shaped, basodorsal lobe broad, truncate dorsally, slightly angled posteriorly with several pale yellow setae; apical half of gonostylus curved dorsomedially into a single tooth; apicoventral area of gonostylus enlarged, bulbous, with numerous dark reddish brown setae. Aedeagus in dorsal view (Fig. 9) with dorsal apodeme oval, sides rounded; anterior margin emarginate; ventral apodeme (Fig. 10) short, not reaching anterior margin of dorsal apodeme, anterior margin truncate, ventral surface with median keel; distiphallus in dorsal view (Fig. 9) slightly expanded laterally at subapex, lateral view (Fig. 11) decurved ventrally at 90° angle, with several small coarse serrations posterolaterally at apex; ejaculatory apodeme in dorsal view (Fig. 9) with anterior half slightly expanded laterally, anterior margin truncate, extending beyond anterior margin of dorsal apodeme, in cross section (Fig. 9 inset) flattened dorsoventrally; lateral ejaculatory process (Figs. 9-10) large, heavily sclerotized, circular, separated medially into lateral halves.

*Variation.* Body length 4.8-6.2, 5.8 mm (N=10). Thoracic macrosetae na 3, sa 2a, pa 1, dc 2, sc 2 (N=10). Av macrosetae 2-5:3-6:6-10 (N=10), pv macrosetae 0:0:2-3 (N=10).

**Description of female.** Similar to male except for following. Length 5.3-6.3, 6.0 mm (N=10).

**Head.** Frons (when viewed frontally) dark brown over dorsal three-fourth, yellowish gray on ventral fourth (entirely yellowish gray when viewed dorsolaterally); setae dark brown, short.

**Thorax.** na 3, sa 2, pa 1, dc 2, sc 2 (N=10). Mesonotum dull brown in ground color, pruinescence dull greenish gray anteriorly; vittae dull brown; setae a mixture of black, short, scattered filiform setae with whitish turquoise iridescent lanceolate appressed setae over entire mesonotum. *Legs.* Femora with av macrosetae 2-7:2-5:6-9 (N=10), pv macrosetae 0:0:1-3 (N=10).



**FIGURES 3 -13.** *Distostylus irwini* n. sp. 3. Tergite 8, epandrium, cerci, and hypoproct, dorsal view. 4. Epandrium, hypoproct ventral view. 5. Sternite 8, hypandrium, and gonocoxite ventral view. 6. Gonocoxite and hypandrium dorsal view. 7. Gonocoxite left lateral view. 8. Gonostylus right lateral view. 9. Aedeagus dorsal view (inset ejaculatory apodeme cross section). 10. Aedeagus ventral view (inset ventral apodeme cross section). 11. Aedeagus lateral. 12. Female sternite 8. 13. Female internal reproductive organs. Scale = 0.1 mm. Abbreviations: Acc = accessory gland duct, C = cercus, CD = common duct, DA = dorsal apodeme, Dp = distiphallus, EA = ejaculatory apodeme, Epa = epandrium, F = furca, GA = gonocoxal apodeme, Gs = gonostylus, Gx = gonocoxite, H = hypandrium, Hpt = hypoproct, IGP = inner gonocoxal process, LEP = lateral ejaculatory process, LEP = lateral ejaculatory process, PG = penal guide, Sp = spermatheca, SpD = spermathecal duct, SpS = spermathecal sac, SS = sensory seta, S8 = sternite 8, T8=tergite 8, VA = ventral apodeme, VL = ventral lobe.



**Abdomen.** Dark reddish brown, subshiny, posterolateral area of tergites 1-7 with gray pruinescence; dorsal setae dark brown, appressed over dark brown areas of tergite 1-4, over entire surface of tergites 5-7 with white appressed lanceolate setae on posterior margin of tergite 1, separated medially, and with white filiform setae posterolaterally on tergites 2-3. *Terminalia.* Dark reddish brown. Penal guide (Fig. 12) clavate anteriorly. Furca (Fig. 13) length 0.40 mm, width 0.20 mm, 2.0 times longer than wide; posterior margin rounded, sides sinuate, anterior margin truncate. Common duct (Fig. 13) shorter than furca. Accessory glands with two, independent openings to the bursa copulatrix (Fig. 13).

**Distribution.** *Distostylus irwini* has only been collected on the island of Dominica.

**Biology.** Specimens of *Distostylus irwini* have been hand-netted on blossoms of beach pea [*Canavalia rosea* (Swartz) A. P. Candolle], or collected at light, or in a Malaise trap in a dry wash in a deciduous forest from 5 October to 20 March at elevations up to 100 m.

**Specimens Examined** (N=25). **Type material.** The holotype male (MEI 146471) of *Distostylus irwini* Webb was collected on the Island of Dominica, St. John Parish, Cabrits National Park [15.583° N, 61.472° W], in a Malaise trap in a dry deciduous forest, elevation 100 m, March 19-20, 2003, by M. E. Irwin, B. M. Shepard, E. Benson, G. & G. Carner, and is deposited in the California Academy of Sciences (type number 17900).

**PARATYPES: DOMINICA. St. George Parish:** Fond Colet, [15.315° N, 61.394° W], 5-5-X-1964, P. J. Spangler, 1 female MEI 040427 (USNM). **St. John Parish:** same data as holotype, 2 males 2 females MEI 146445, 146473-4, 146478 (MEI), 1 male 1 female MEI 146975-6 (CUCC); Cabrit Swamp, [15.583° N, 61.472° W], 3-XI-1964, P. J. Spangler, 1 female MEI 040425 (USNM). **St. Joseph Parish:** Clarke Hall, [15.4° N, 61.4° W], 12-III-1964, D. F. Bray, 1 male MEI 040428 (USNM), on yellow blossom of beach pea [*Canavalia rosea*]; Macoucheri [Estate], [15.422° N, 61.439° W], 12-II-1965, W. W. Wirth, 1 female MEI 040424 (USNM), at light; 14-II-1965, H. Evans, 1 female MEI 040426 (USNM). **St. Mark Parish:** 1 km S Pointe Guignard, (15.243° N, 61.372° W), 17-19-III-2003, 100 m, M. E. Irwin, B. M. Shepard, E. Benson, & G. Carner, 1 female MEI 146692 (CASC), 1 female MEI 146479 (MEI), 1 female 146908 (INHS); 4 km N Soufriere, [15.238° N, 61.367° W], 75 m, 17-19-III-2003, M. E. Irwin, B. M. Shepard, E. Benson, & G. Carner, 2 females MEI 146472, 146477 (CUCC), Malaise trap in dry wash of deciduous forest. **St. Peter Parish:** Anse Mulâtre Ravine, 2 km S Dublanc [15.505° N, 61.463° W], 15-19-III-2003, 50 m, M. E. Irwin, B. M. Shepard, E. Benson, & G. Carner, 1 male MEI 146961 (INHS), 7 males MEI 146963, 146967, 146969, 146973, 146974, 146978, 146989 (CUCC).

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The research for this project was apportioned as follows: Metz completed the evaluation and assignment of the taxa, genitalia dissections, character analysis, and cladistic analysis; Webb completed the descriptive taxonomy and nomenclature, including the illustrations and organization of the specimens.

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Appendix 1  
Character matrix

Appendix 1. Character matrix

Species/Character Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
<i>Ambradolon grimaldii</i>	0	?	?	?	?	?	?	1	0	1	?	?	?	?	?	?	?	1	2	0	?	?	?	?	?	?	?	?	?	?	
<i>Brachylinga baccata</i>	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
<i>Distostylus irwini</i>	0	0	1	0	1	0	0	1	0	1	0	0,1	1	0	1	0	2	0	0	1	0	0	0	0	0	0	0	1	1	0	0
<i>Insulatitan romaynae</i>	1	0	1	1	1	1	1	0	0	1	0	1	1	1	1	0	0	1	2	0	1	1	1	1	1	0	1	2	0	1	1
<i>Insulatitan youngi</i>	1	0	1	1	1	1	1	0	0	1	0	1	1	1	1	0	0	1	2	0	1	1	1	2	0	1	1	2	0	1	1
<i>Lindneria wintertoni</i>	0	1	1	1	1	0	0	0	1	1	0	0	1	0	0	1	2	2	1	2	1	0	0	0	0	0	0	0	0	0	0
<i>Litolinga acuta</i>	0	0	0	0	0	0	0	0	1	1	0	0	1	0	1	2	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0
<i>Lysilinga aurantiaca</i>	0	0	0	0	0	0	0	0,1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0
<i>Penniverpa festina</i>	0	1	1	0	1	0	0	0	1	1	0	1	0	0	0	2	1	0	1	1	0	0	0	0	0	1	0	1	0	1	0

**Appendix 2**

List of characters used in cladistic analysis (modified from Metz &amp; Irwin 2000)

1. Ocellar tubercle; raised on callus (0), flush with rest of frons (1)
2. Postgena setae; present (0), absent (1)
3. First flagellomere; stout, ovate (0), spindle shaped (1)
4. Female frons setae; present (0), absent (1)
5. Female frons depressions adjacent to eye margin; present (0), absent (1)
6. Female frons height;  $\leq 1.5 \times$  width at antennal bases (0),  $\geq 2 \times$  width at antennal bases (1)
7. Postocular setae with; additional setae ventral to dorsal row (0), dorsal row only (1)
8. Dorsocentral macrosetae; absent (0), present (1)
9. Scutellar macrosetae; two pair (0), one pair (1)
10. Metanepisternum setae; present (0), absent (1)
11. Male lateral notal vittae; present (0), absent (1)
12. Midcoxa posterolateral surface setae; present (0), absent (1)
13. Midfemur anteroventral setae; absent (0), present (1)
14. Abdominal setae; filiform or lanceolate (0), broad scales (1)
15. Lengths of dorsal and ventral apodemes; ventral apodeme longer or apodemes subequal (0), dorsal apodeme much longer (1)
16. Anterior ejaculatory apodeme; broadened laterally (0), broadened laterally and bifurcate (1), cylindrical (2)
17. Anterior ventral apodeme; cylindrical (0), laterally flattened (1), dorsoventrally flattened (2)
18. Epandrium posteromedial corner; not extended (0), extended (1)
19. Epandrium posterior extension; flanged, no fusion (0), not flanged (1), flanged and fused (2)
20. Hypoproct posterior margin; emarginate (0), truncate or rounded (1)
21. Sternite 8 posterior margin; evenly rounded, truncate, or emarginate (0), pointed (1)
22. Tergite 8 medially;  $\leq 0.2 \times$  length laterally (0),  $\geq 0.25 \times$  length laterally (1)
23. Tergite 8 posterior margin setae; laterally only (0), continuous across posterior margin (1)
24. Gonocoxite ventromedial setae; absent (0), present (1), present on callus (2)
25. Gonocoxal apodeme extension; less than or subequal to anterior gonocoxal margin (0), beyond gonocoxal margin (1)
26. Hypandrium; much wider than long (0), disclike (1)
27. Hypandrium fusion to gonocoxite; fused laterally (0), not fused (1)
28. Inner gonocoxal process; absent (0), present fused to gonocoxite (1), present, articulated (2)
29. Spines on lateral edge of apical distiphallus; present (0), absent (1)
30. Median lobe of female tergite 9 setae; absent (0), present (1)