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Tropidosteptes forestierae (Hemiptera: Heteroptera: Miridae: Mirinae):
A New Species of Plant Bug Injuring Ornamental Florida Swampprivet,
Forestiera segregata (Oleaceae), in South Florida

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Tropidosteptes forestierae (Hemiptera: Heteroptera: Miridae: Mirinae):
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Abstract. The mirine plant bug *Tropidosteptes forestierae*, **new species** (Hemiptera: Miridae) is described from Collier County, Florida, where it was found causing serious injury to an extensive ornamental hedge of Florida swampprivet, *Forestiera segregata* (Jacq.) Krug and Urb. (Oleaceae). Adult male and female, fifth instar, and egg are described. Color images of the adults, nymph, egg, and injury; scanning photomicrographs of selected adult structures; and illustrations of male genitalia are provided. A key to help distinguish the 16 species of *Tropidosteptes* known to occur in the southeastern United States is given.

Key words. Heteroptera, Miridae, Mirinae, *Tropidosteptes*, new species, Florida, host, injury, *Forestiera segregata*

Introduction

Fifty-two species are currently included in the New World plant bug genus *Tropidosteptes* Uhler (Miridae) (Schuh 1995), most of which were previously placed in the synonymic genera *Neoborus* Distant and *Xenoborus* Reuter (Carvalho 1954, Kelton 1978). Of these, 37 species are known from the United States and Canada, with 25 recorded in eastern North America (Henry and Wheeler 1988). Although there are no comprehensive identification keys, Knight (1923) keyed the 13 species known from Connecticut and vicinity; Blatchley (1926) gave a slightly modified version of Knight's (1923) key to eastern U.S. species; Knight (1941) keyed 14 species from Illinois; and Kelton (1980) included nine species in his key to the species of the Canadian prairie provinces.

Most North American species are associated with trees and shrubs in the family Oleaceae, especially species of ash, *Fraxinus* spp. (Knight 1917), and several species in related genera, such as white fringe tree, *Chionanthus virginicus* L. (Knight 1927), and devilwood, *Osmanthus americanus* (L.) Benth. and Hook. f. ex A. Gray (Knight 1923, 1941). Two exceptions in the East are *T. populi* (Knight 1929), described and known only from Illinois on cottonwood (*Populus deltoides* Bartram ex March.), and *T. quercicola* (Johnston 1939), described from Texas on live oak (*Quercus virginiana* Mill.) and later reported from Florida (Halbert 2008). We note that although the latter species clearly is not congeneric with other species of *Tropidosteptes*, we are retaining it in the genus until the group can be revised.

Species of the genus typically feed on the abaxial leaf surface, resulting in tiny, tell-tale, white, chlorotic spots on the upper surfaces of the host's foliage (Dickerson and Weiss 1916, Usinger 1945), frequently warranting chemical treatment (Wheeler and Henry 1974). Large populations may cause much more extensive chlorosis, leaf curling, and necrosis, resulting in dead or withered foliage that eventually may drop prematurely, sometimes resulting in total defoliation (Henry 1980; Wheeler 1982, 2001).

In this paper, a new species of *Tropidosteptes* is described from a large population in Collier Co., Florida, that was found severely injuring an ornamental Florida swampprivet, *Forestiera segregata* (Jacq.) Krug and Urb. (Oleaceae) hedge, and a specimen taken in Miami-Dade Co. Color habitus images of the adult male and female, fifth-instar nymph, egg, and foliar damage, a diagnosis and description of the adult, fifth instar, and egg, scanning electron photomicrographs of selected structures, and illustrations of male genitalia are provided. The first key to the 16 species of *Tropidosteptes* occurring in the southeastern United States is given to help distinguish *T. forestierae*.

Materials and Methods

Color adult habitus images were captured using an EntoVision Imaging Suite that included a JVC KY-75 3CCD digital camera mounted to a Leica M16 zoom lens via a Leica z-step microscope stand. Multiple focal planes were merged using Cartograph 5.6.0 (Microvision Instruments, France) software. Scanning photomicrographs of selected adult structures were taken using a Zeiss EVO/15 scanning electron microscope at 6 kv. The specimen was mounted on a standard 13 mm stub and sputter coated. Habitat images were taken with a Nikon 995 Coolpix digital camera.

Specimens are deposited in the Florida State Collection of Arthropods (FSCA), Florida Department of Agriculture and Consumer Services, Gainesville, Florida, and the National Museum of Natural History (USNM) collection, Smithsonian Institution, Washington, D.C.

We use the common name Florida swampprivet for *Forestiera segregata*, following the USDA, NRCS (2011) PLANTS Database, but also note that this plant is sometimes referred to more simply as Florida privet (e.g., Betrock's Plant Finder 2011).

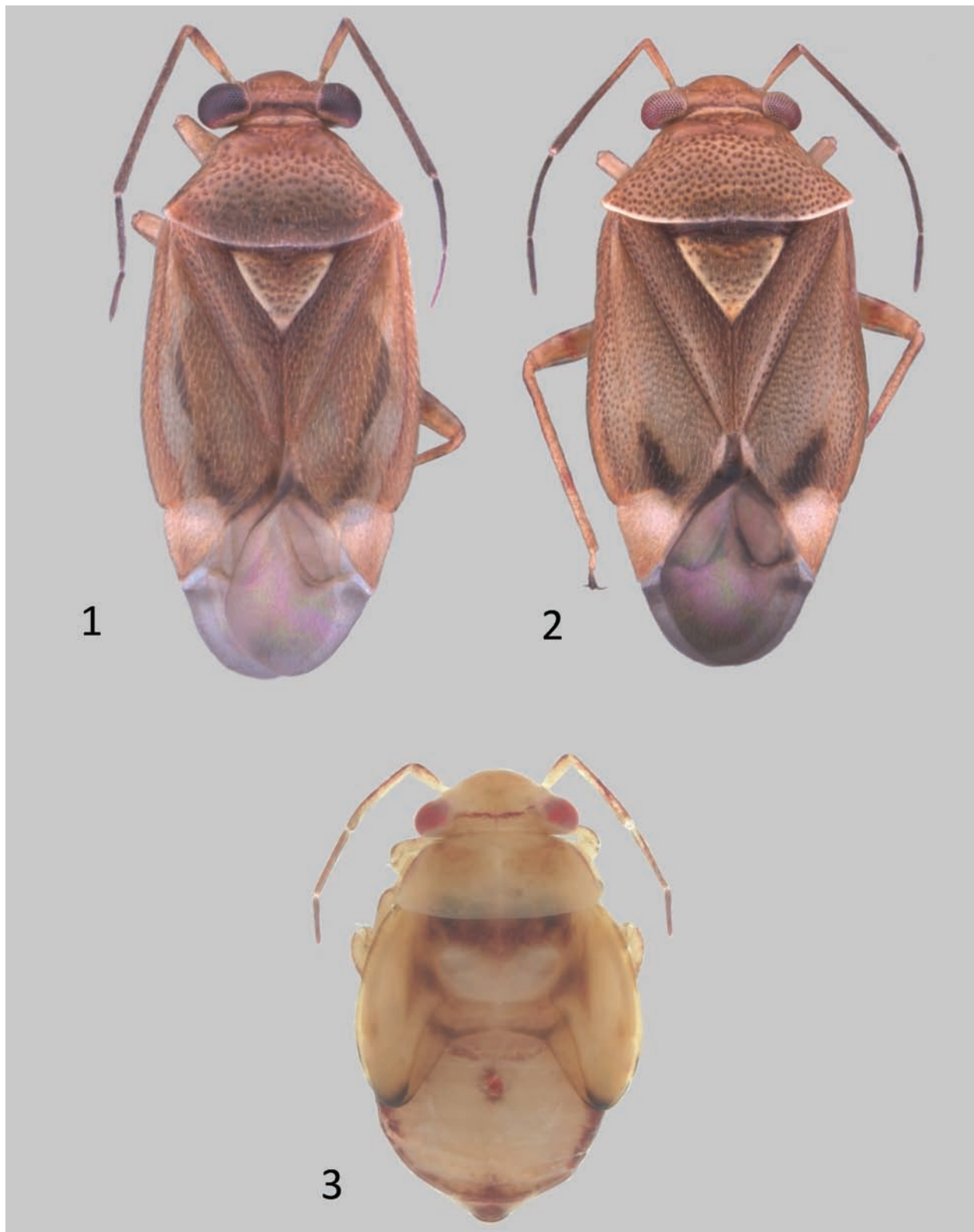
Tropidosteptes forestierae Henry, New Species

(Fig. 1–17)

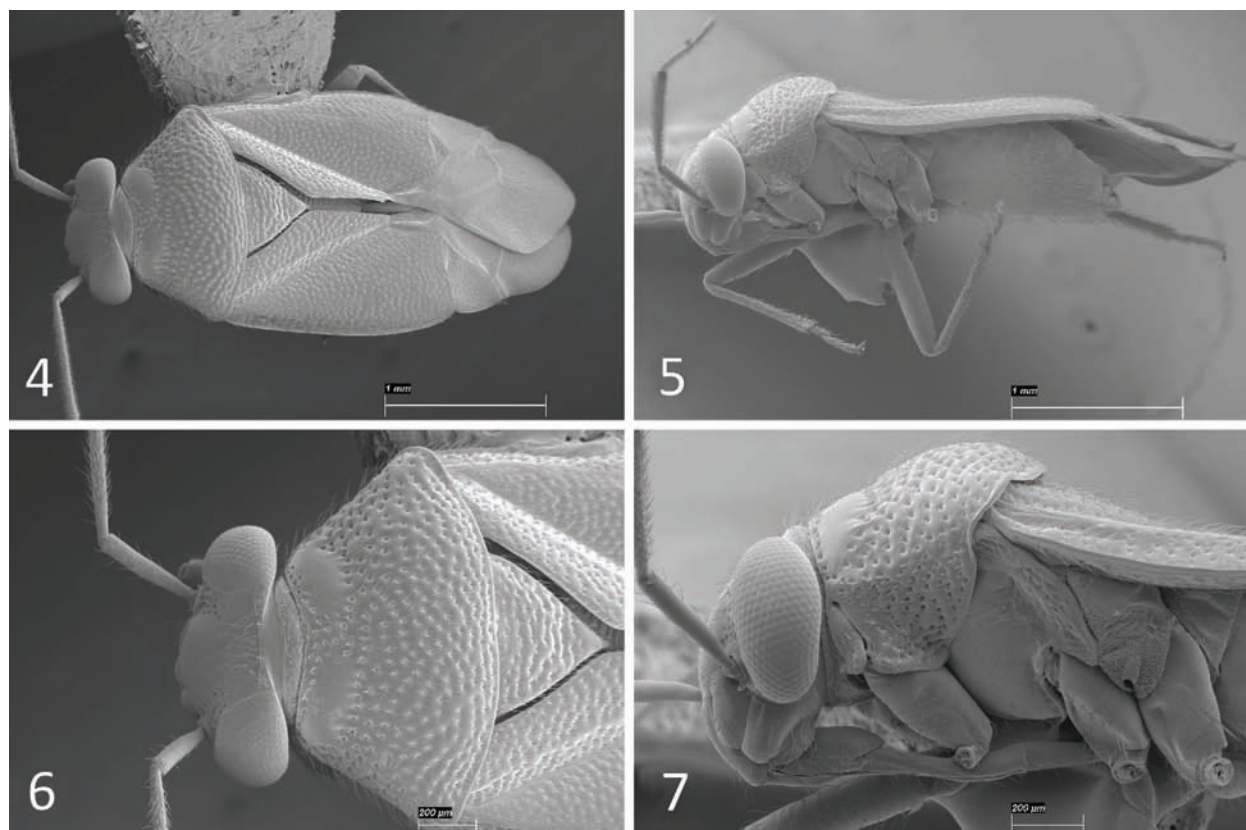
Diagnosis. *Tropidosteptes forestierae* is distinguished by the overall yellowish-brown color; the narrow, dark brown, transverse line along the carinate basal margin of the head; the yellowish-brown antennal segment I, with the inner surface sometimes dark brown; the dark brown antennal segment II; the pale or whitish collar; the pale yellow, narrow, basal margin of the pronotum and margins of the scutellum; the dark brown, oblique streak at the apex of the corium extending onto the inner basal margin of the cuneus (paracuneus); the yellowish-brown legs, with hind femur sometimes having a subapical dark brown spot or band; and the dense, short, semierect setae on the dorsum.

This new species will key to *Neoborus* in Knight (1923, 1941), based on the vague lateral pronotal carina and the slender first antennal segment. Within the generic key, *T. forestierae* will run in the section for pubescent species (versus glabrous species) to *T. pubescens* (Knight) based on the pubescent dorsum, the pale first antennal segment, the pale dorsum, and the yellow scutellum lacking a median black line. It can be distinguished from *T. pubescens* by the uniformly yellowish-brown dorsum, with only a dark brown streak on the apex of the corium sometimes running onto the base of the cuneus, a dark brown to black line across the carinate basal margin of the head, and sometimes a subapical brown band on each hind femur. *Tropidosteptes pubescens* is pale yellowish brown, with a median dark line on the head, the pronotum is extensively infuscated often with yellow lines, the inner half of the clavus and the apical half of the corium are usually dark brown, and the hind femur lacks a subapical brown spot or band.

Of the pubescent U.S. species of *Tropidosteptes*, *T. forestierae* is most similar to *T. adustus* Knight, *T. canadensis* (Van Duzee), *T. pacificus* (Van Duzee), *T. rufusculus* (Knight), and *T. vittifrons* (Knight) in having an overall yellowish-brown dorsum. All five differ from *T. forestierae* in having a distinct fuscous spot on each pronotal callus; *T. adustus*, *T. canadensis*, *T. rufusculus*, and *T. vittifrons* usually



Figures 1–3. *Tropidosteptes forestierae*. 1) Adult male, dorsal aspect. 2) Adult female, dorsal aspect. 3) Fifth instar, dorsal aspect.

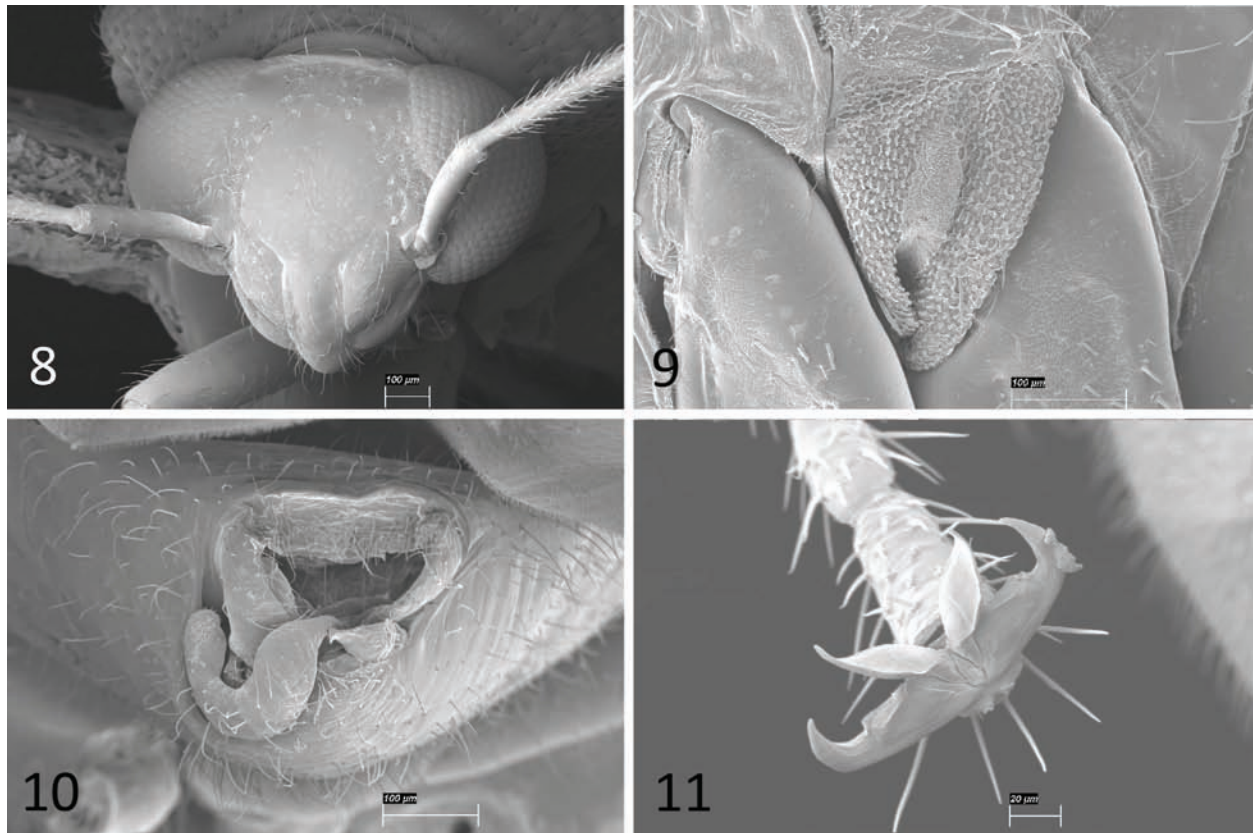


Figures 4–7. Scanning electron photomicrographs. 4) Full dorsal aspect. 5) Full lateral aspect. 6) Head and pronotum, dorsal aspect. 7) Head and pronotum, lateral aspect.

have a darker brown scutellum with the median line pale; paler specimens of *T. canadensis* with a uniformly yellow scutellum always have the fuscous or black spots on the calli; and *T. pacificus* has a distinct fuscous spot at the base of each tibia. In addition, *T. canadensis*, *T. pacificus*, and *T. vittifrons* are not known from the Southeast or Florida, thus, reducing possible confusion.

Description. *Male* (n = 10; holotype in parentheses) (Fig. 1, 4–5): Dorsal length to apex of hemelytral membrane 3.10–3.52 mm (3.42 mm), dorsal length to base of cuneus 2.24–2.56 mm (2.43 mm), width across widest area of hemelytra 1.34–1.57 mm (1.62 mm). *Head*: Width across eyes 0.85–0.92 mm (0.93 mm), length 0.32–0.35 mm (0.34 mm), narrowest interocular width 0.34–0.35 mm (0.37 mm). *Labium*: Length 0.94–1.04 mm (1.04 mm), extending to base of middle coxae. *Antenna*: Segment I length 0.37–0.38 mm (0.38 mm), II 0.94–1.02 mm (1.02 mm), III 0.43–0.50 mm (0.50 mm), IV 0.32–0.34 mm (0.35 mm). *Pronotum*: Median length 0.72–0.78 mm (0.78 mm), basal width 1.25–1.38 mm (1.39 mm).

COLORATION: *Head*: Shiny yellowish brown, with apex of clypeus (tylus) more pale reddish brown, transverse carina at base of vertex between eyes narrowly fuscous to black; eyes brown, tinged with red. *Labium*: Pale yellowish brown, apical half of segment IV dark brown. *Antenna*: Segment I uniformly yellowish brown, with inner half sometimes darker brown; segments II–IV dark brown to fuscous. *Pronotum*: Yellowish brown, collar pale or whitish, calli yellowish brown to slightly more reddish brown on some specimens, posterior margin narrowly pale yellow. *Scutellum*: Yellowish brown, lateral margins broadly pale yellow. *Hemelytron*: Yellowish brown, cuneus slightly paler brown; apex of corium near inner basal margin of cuneus with an oblique, elongate, dark brown mark extending slightly onto inner angle (paracuneus) of cuneus; membrane dark smoky translucent brown, veins and small spot adjacent to large areole darker brown. *Ostiolar evaporative area* (Fig. 9): Uniformly pale or whitish. *Ventral surface*: Thorax dark brown to reddish brown ventrally; propleural area yellowish brown, ventral margin and meso- and metapleura dark brown; abdomen yellowish brown, upper lateral margins often darker brown. *Legs*: Coxa and trochanters uniformly pale yellow; femora pale yellow,



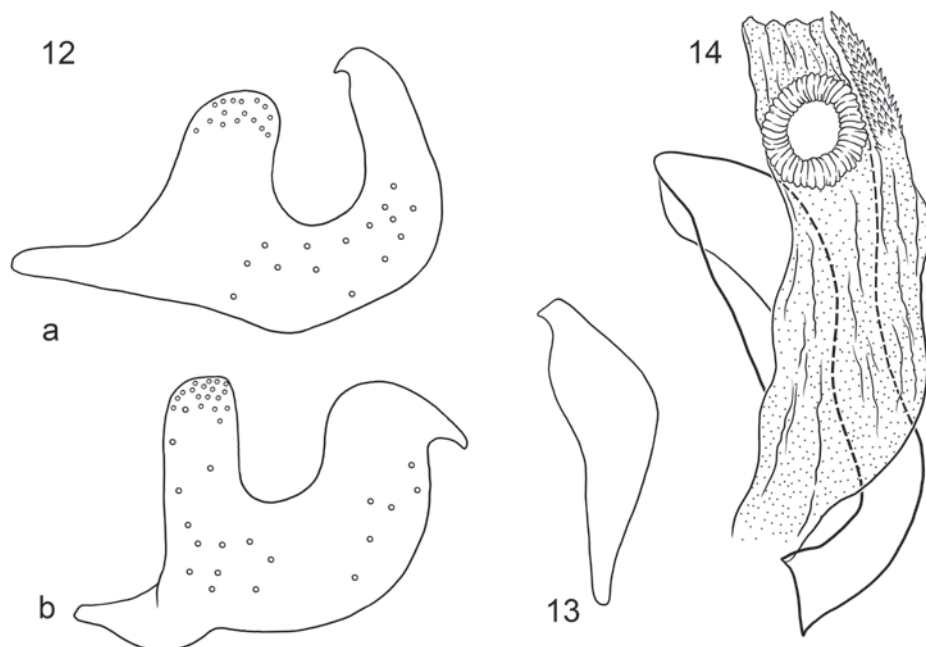
Figures 9–11. Scanning electron photomicrographs. **8)** Head, frontal aspect. **9)** Ostiolar evaporative area. **10)** Male genital capsule, caudal aspect. **11)** Claw.

hind femur sometimes with a subapical dark brown band or blotch dorsally; tibiae yellowish to slightly darker yellowish brown, with a short, narrow, brown line or spot at base of each; tarsi yellowish brown, apical half of last tarsomere and claws (Fig. 11) dark brown, with broad, fleshy, divergent parempodia.

STRUCTURE, TEXTURE, AND VESTITURE: *Head* (Fig. 6–8): Shiny, largely impunctate, except for a U-shaped row of punctures, three punctures wide, extending from the base of each antenna along the inner margin of each eye and across vertex; basal margin along vertex narrowly carinate; eyes coarsely granulate; nearly glabrous except for a few short, recumbent setae at apex of tylus and along U-shaped row of punctures. *Antenna:* Segment I with only a few scattered semierect setae; segment II thickly set with recumbent and semierect setae, some subequal to diameter of segment; segments III and IV with numerous recumbent and semierect setae, some nearly equal to two times diameter of each segment. *Pronotum:* Trapeziform, lateral margins straight, basal margin weakly convex; collar broad, impunctate, subequal to diameter of antennal segment I; evenly scattered with deep, setigerous, brown-stained punctures, except for shiny, impunctate calli. *Scutellum:* Equilateral, evenly scattered with deep, setigerous punctures, except for impunctate pale lateral margins. *Hemelytron:* Evenly scattered with shallow, setigerous punctures; setae semierect, pale brown.

Male genitalia (Fig. 10): *Left paramere* (Fig. 12): Stout, with broad basal sensory lobe and a long, curving, apically hooked distal arm. *Right paramere* (Fig. 13): Slender, broadening through middle, and narrowing distally, with a small apical hook. *Endosoma* (Fig. 14): Largely membranous, with a distinct secondary gonopore and a single sclerotized spicule, densely covered with tiny spines on distal half.

Female (n = 10) (Fig. 2): Dorsal length to apex of hemelytral membrane 3.36–3.84 mm, dorsal length to base of cuneus 2.66–2.78 mm, width across widest area of hemelytra 1.70–1.73 mm. *Head:* Width across eyes 0.96–0.99 mm, length 0.37–0.40 mm, narrowest interocular width 0.43–0.45 mm. *Labium:* Length 1.09–1.10 mm, extending to middle coxae. *Antenna:* Segment I length 0.35–0.37 mm, II 0.90–0.96 mm, III 0.48–0.50 mm, IV 0.29–0.30 mm. *Pronotum:* Median length 0.83–0.91 mm, basal width 1.49–1.60 mm.



Figures 12–14. Male genitalia. **12)** Left paramere (a, caudal aspect; b, rotated left to show lateral arm). **13)** Right paramere, caudal aspect. **14)** Endosoma, with distinct secondary gonopore and single apically spinose spiculum.

Similar to male in color and pubescence, differing primarily in the overall broader body form and proportionately wider head and interocular width.

Fifth Instar ($n = 5$) (Fig. 3): Dorsal length 2.34–2.50 mm, dorsal width across base of wing pads 1.57–1.63 mm. *Head*: Width 0.83–0.93 mm, interocular width 0.37–0.48 mm. *Labium*: Length 0.93–0.99 mm, extending to bases of middle coxae. *Antenna*: Segment I, length 0.21–0.26 mm; II 0.51–0.59 mm; III 0.40–0.43 mm; IV 0.32–0.37 mm.

Shiny, broadly rounded. *Head*: Pale brownish yellow, eyes red, narrow transverse line across base of interocular space and apex of clypeus dark reddish brown. *Labium*: Stout, pale brownish yellow, with labrum and apical half of segment IV dark brown. *Antenna*: Pale yellow, with a narrow reddish-brown line on anterior face of segments I–IV. *Pronotum*: Pale yellowish brown, with each lateral margin sometimes with a narrow reddish-brown line. *Mesoscutal area*: Brownish yellow, with basal margin often accented with reddish brown. *Wing pads*: Pale brownish yellow, often margined with dark brown apically. *Abdomen*: Pale yellowish brown; lateral margins and transversely across dorsum of 7th or 8th segment reddish brown; ventral surface uniformly pale brownish yellow with lateral margins narrowly reddish brown. *Legs*: Uniformly pale brownish yellow, with a subapical brown spot on each hind femur and outer basal half of each tibia with a narrow reddish line.

Egg ($n = 2$, removed from female abdomen) (Fig. 16): Length 0.70–0.72 mm, width across operculum 0.16–0.18 mm, maximum width across basal third 0.19–0.21 mm. Elongate, convex distally; chorion smooth, white to creamy white; operculum distinct, protruding from leaf tissue *in situ*.

Etymology. The specific epithet “*forestierae*” is taken from the oleaceous host-plant genus, *Forestiera* Poiret.

Host. Florida swampprivet, *Forestiera segregata* (Jacq.) Krug and Urb. (Oleaceae).

Distribution. Known from Collier and Miami-Dade counties, Florida.

Type material. **Holotype** male, Florida, Collier Co., Naples, Naples Blvd., Moe’s Restaurant area, 18 May 2010, 26°13.02’N, 81°46.16’W, D. L. Caldwell coll., taken on *Forestiera segregata* (Oleaceae) (USNM).



Figures 15–18. *Tropidosteptes forestierae* on host plant. **15)** Adults and nymph showing feeding injury and black spots of excrement. **16)** Egg inserted into host tissue. **17)** Partially defoliated *F. segregata* hedge resulting from feeding by *T. forestierae*. **18)** Healthy *F. segregata* hedge.

Paratypes: 1 female, Miami-Dade Co., Mont. Bot. Ctr., 30 May 2000, T. Dobbs, sweep net (USNM); 16 males, 12 females, same data as for holotype (4 males, 4 females FSCA; remainder in USNM); 47 males, 33 females, Florida, Collier Co., Naples, 6434 Naples Blvd., 26°13.10'N, 81°46.15'W, 14 May 2010, Scott Krueger coll., taken on *Forestiera segregata* (16 males, 16 females FSCA; remainder in USNM).

Discussion. All specimens of this species are from the Naples-Collier County site, except for a specimen swept in Miami-Dade County in 2000 by T. Dobbs. This latter specimen from the opposite side of the state indicates that *T. forestierae* probably occurs over much of the area where its host is found. According to the USDA, NRCS (2011) PLANTS Database, *F. segregata* is known from Florida, Georgia, and South Carolina (and Puerto Rico).

In May 2010, a large, trimmed, ornamental planting of swampprivet in parking lot island areas and property perimeters of a mini-mall about 0.05 km (= 0.08 mi) wide by about 0.6 km (= 0.1 mi) long in Naples, Florida, was found infested with an unknown plant bug. There were about 12 hedge areas, with the largest being about 0.6 km (= 0.1 mi) long, and about 12 parking lot islands, measuring 6 to 9 meters (about 20 to 30 feet) long. These were sheared and maintained at height of about 1.2 meters (= 4 feet). The plant bugs were causing severe yellowish-tan spotting, with many of the leaves dropping from the plants. Dark spots of varnishlike excrement were abundant on the undersides of the leaves (Fig. 16). Defoliation of about 10% of the hedges was noticed on 10 May 2010. At this time the plant bugs were very numerous and easily collected with a net. By late May or early June, large portions of the hedge were completely defoliated (Fig. 17). The mirids were still numerous during a follow-up collection on 18 May. In late May, the shrubs reportedly were sprayed due to the amount of damage being caused. Observations were not taken on a regular basis, but the defoliated hedges had re-foliated

by 2 November. Light plant bug damage was observed in May and August of 2011, but no living plant bugs were found, most likely because of preventive insecticidal treatments.

The following key includes the species of *Tropidosteptes* known from Alabama, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia.

Key to the Species of *Tropidosteptes* Occurring in the Southeastern United States

- | | | |
|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| 1. | Lateral margin of pronotum with a thick, yellow, calloused line..... | 2 |
| – | Lateral margins of pronotum without a thick, yellow, calloused line, at most with a thin carina
concolorous with surrounding area, carina sometimes bordered ventrally by a slender black
line | 7 |
| 2(1). | Dorsum glabrous or nearly so | 3 |
| – | Dorsum distinctly pubescent..... | 6 |
| 3(2). | Membrane dark smoky brown to black..... | 4 |
| – | Membrane clear | 5 |
| 4(3). | Dorsum, including scutellum, fuscous to black, pronotum sometimes indistinctly invaded with
small, irregular, pale areas around calli or a narrow pale line on disc; scutellum flat, level
with hemelytra..... | <i>T. geminus</i> (Say) |
| – | Dorsum yellowish brown, with four to six blotches on pronotal disc, apical third and a spot on
the basal third of the corium, and a spot on either side of midline on scutellum dark brown;
scutellum convex, swollen above level of hemelytra..... | <i>T. quercicola</i> (Johnston) |
| 5(3). | Mostly pale yellowish-brown species, with a black line on hemelytron bordering outer margin
of radius, curving mesad across apical area of corium; calli often with a diagonal dark brown
line through middle and sometimes with a slender dark ray extending onto disk..... | <i>T. palmeri</i> (Reuter) |
| – | Highly variable, pale yellow to dark species but always lacking a black line along radius; apical
half of corium red to fuscous, becoming more extensive on some specimens; pronotum yellow,
often with two to five longitudinal dark lines on disc (six subspecies/color forms described for
this species); membrane clear, even on darkest specimens..... | <i>T. amoenus</i> Reuter |
| 6(2). | Scutellum yellow, with median line black, line sometimes not extending completely to apex;
outer margin of corium with a thick dark line widening from the base of embolium to the base
of cuneus, apical half of corium sometimes infuscated..... | <i>T. vittiscutis</i> (Knight) |
| | Scutellum yellow or yellowish brown, sometimes dark at middle of base but never with
median line black; emboliar margin always at least partly pale, apical third to half of corium
infuscated | <i>T. pubescens</i> (Knight) |
| 7(1). | Dorsum glabrous | 8 |
| – | Dorsum pubescent..... | 10 |
| 8(7). | Head, pronotum, scutellum, and most of hemelytra red; antennae, legs, and membrane black,
clavus and inner half of corium often black | <i>T. cardinalis</i> Uhler |
| – | Dorsum not red; legs and membrane pale..... | 9 |

- 9(8). Antennal segment I pale; lateral pronotal carina usually accented with a narrow fuscous line; scutellum dark brown through middle, with median line and basal angles yellow, darkest specimens sometimes lacking pale median line; cuneus pale, with apex brown to dark brown *T. glaber* (Knight)
- Antennal segment I fuscous to black; lateral pronotal carina indistinct, without fuscous line; scutellum predominantly yellow, sometimes with middle of base broadly infuscated; cuneus pale, with apical third red *T. osmanthicola* (Johnston)
- 10(7). Scutellum predominantly yellow, middle of base sometimes infuscated 11
- Scutellum entirely fuscous or black, or yellow with dark brown lines through middle 14
- 11(10). Large, subparallel species, length greater than 5.00 mm; antennae black 12
- Smaller, more elongate-oval species, length less than 4.5 mm; antennae pale 13
- 12(11). Pronotum uniformly reddish to fuscous; hind femur pale, distally fuscous or with two subapical brown bands; left paramere with basal process subequal to length of lateral arm *T. pettiti* Reuter
- Pronotum pale, with calli and a broad ray behind each fuscous to black; hind femur uniformly pale or with only a vague subapical brown band; left paramere with basal process much shorter than lateral arm *T. neglectus* (Knight)
- 13(11). Dorsum, including calli, uniformly pale yellowish brown, with only a short, oblique darker brown line at apex of corium, extending slightly onto base of paracuneus, and a narrow fuscous line across basal carina of vertex *T. forestierae* Henry, n. sp.
- Dorsum yellowish brown, with calli fuscous to black, corium with a line along costal margin and apical third brown, darker specimens sometimes with a dark ray behind each callus *T. chionanthi* (Knight)
- 14(10). Pronotum, scutellum, clavus, and corium uniformly black; cuneus, legs, and most of antennae whitish to pale whitish yellow *T. tricolor* Van Duzee
- Dorsum largely yellowish brown to dark brown; scutellum dark brown with median line and basal angles yellowish 15
- 15(14). First and usually second antennal segment black; hind femora with two subapical brown to fuscous bands *T. rufusculus* (Knight)
- Antennae pale yellowish brown, inner margin of segment I sometimes infuscated; hind femora uniformly pale yellowish brown, sometimes with a small, subapical, brown spot *T. adustus* (Knight)

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