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Laura Torres Miller

West Virginia Department of Agriculture, Charleston, WV

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A taxonomic study of the genus *Atheas* Champion (Heteroptera: Tingidae)

Laura Torres Miller
Plant Industries Division
West Virginia Department of Agriculture
Charleston, WV 25305

ABSTRACT. The genus *Atheas* Champion is revised. A key to all 14 species cataloged in the genus is included. Species occurring in Mexico are redefined and illustrated. Descriptions of species not occurring in Mexico are also provided. Host plant information has been included, when available.

Key Words: Heteroptera, Tingidae, *Atheas*, revision, Mexico, key.

Introduction

The present work was based on the author's master's thesis that was mainly intended to broaden the knowledge of the Mexican species of Tingidae (Miller, 1992). This study deals with the genus *Atheas*, with an emphasis on the species occurring in Mexico, which are redefined and illustrated. Diagnostic descriptions, but not illustrations, for species not occurring in Mexico have been included to make the study more inclusive, as well as a much needed key for all 14 species known. Previous taxonomic work done by Champion (1898), Heidemann (1909), Blatchley (1926), Froeschner (1944), and Slater and Baranowsky (1978) have included some keys, but these treated only a few species.

The genus *Atheas* was described by Champion (1898), the type species of which is *A. nigricornis* Champion (designated by Van Duzee, 1916). In the same paper Champion described two other new species: *A. flavipes* and *A. fuscipes*. He also included a key and illustrations for the three new species. In 1909, Heidemann contributed four new species: *Atheas insignis*, *A. austroriparius*, *A. exiguus* and *A. mimeticus*. His work includes illustrations and a key to the four new species. Osborn and Drake (1917) described *A. annulatus* and *A. sordidus*, which later proved to be synonyms of *A. mimeticus*. The presence of brachypterous and macropterous specimens in these species led to confusion. *Atheas tristis*, was described by Van Duzee (1923). Drake and Hambleton (1935) described *A. ornatipes* from Brazil. The remaining species of the genus were described between 1938 and 1947. Drake described *A. mirabilis* in 1938 and *A. paganus* in 1942. Drake and Poor (1940) described *A. placentis*, and *A. laetantis* was described by Drake and Hambleton

(1944). The last species to be described, *A. cearanus*, was by Monte in 1947.

The genus *Atheas* has been included in the catalogs of Banks (1910), Van Duzee (1917), Monte (1941), Drake and Ruhoff (1960, 1965), and most recently Henry and Froeschner (1988).

Recent taxonomic work not included in the catalogs has been done by Slater and Baranowsky (1978), and it includes diagnostic descriptions of two species occurring in the United States. Additionally, Brailovsky and Torres (1986), in a revision of the Mexican genera, redefined and illustrated *Atheas*.

Distributional and host plant studies have been done by Barber (1914), Osborn and Drake (1915), Van Duzee (1916), McAtee (1923), Drake (1925), Drake and Hambleton (1934), De Costa Lima (1936), Drake and Hambleton (1938), Monte (1939), Hurd (1946), and Beshear, et al. (1976).

The genus *Atheas* is endemic to the New World. Species occur from north central and northeastern United States south to Mexico, Central America and South America. Of the 14 species recorded for the genus, six are of Nearctic origin, and the rest are from the Neotropical Region.

Most species of *Atheas* are of little or no economic significance. *Atheas cearanus* is probably the most important one because it feeds on several species of *Manihot* or cassava. The tuberous roots are used to obtain the starch from which tapioca is made. Also some species of *Manihot* are used to obtain rubber (Bailey, 1949). Other species of *Atheas* feed on ornamentals or wild plants.

The present study was based on specimens deposited in the insect collections of the U.S. National Museum of Natural History, Washington D.C. (USNM); Instituto de Biología, National Uni-

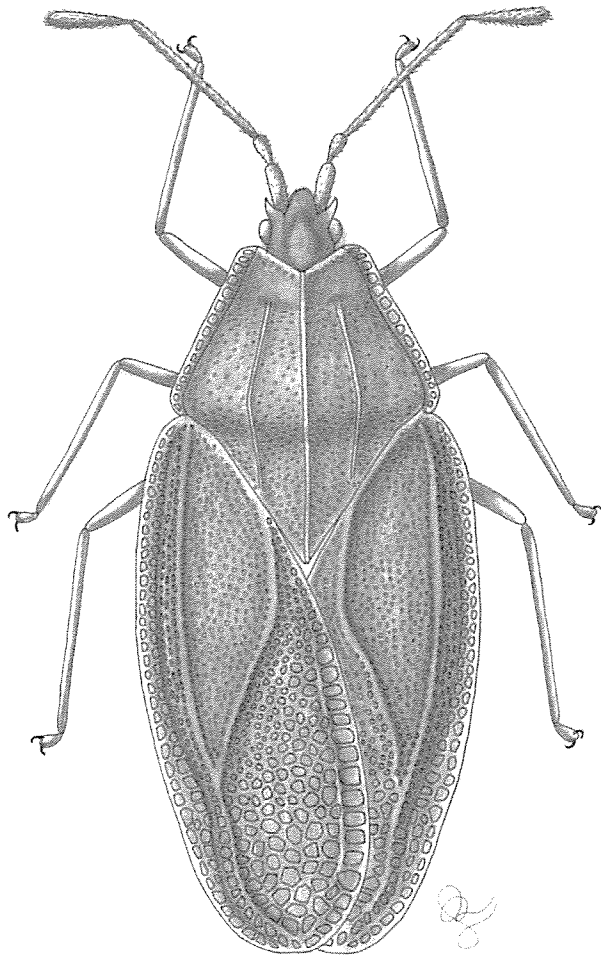


Figure 1. Genus *Atheas* Champion, dorsal view.

versity of Mexico, Mexico City (UNAM); Texas A&M University, College of Agriculture, Texas (TAMU); and the Museu Nacional, Rio de Janeiro, Brazil (MNRJ). Since this work emphasizes the species occurring in Mexico, hundreds of specimens from Mexico were examined. Only a relatively small number of specimens from other countries, particularly of those species not occurring in Mexico, was examined. Holotypes and paratypes examined were from the USNM, with the exception of the paratypes of *A. cearanus* which were on loan from the MNRJ.

When Champion (1898) wrote a key for the first three described species of *Atheas*, he separated them according to shape and thickness of the antenniferous tubercles. However, measurements were not included in his comparisons. Because of its importance, the same characteristic was used in the present study. The length of the antenniferous

tubercles was measured and compared to the width of the first antennal segment. This characteristic was used to separate the species into two main groups: those with "long" antenniferous tubercles and those with "short" antenniferous tubercles.

Further studies on several other structures provided other useful characters. Comparisons among the widths of the costal, subcostal and discoidal areas, and comparisons of the antennal segment lengths, as well as their coloration, were the main characteristics employed in separating the species. Variations of rostral length could also prove to be useful in separating species. However, due to the reduced number of specimens examined of some species, particularly from South America, this character was not used in the key.

Genus *Atheas* Champion

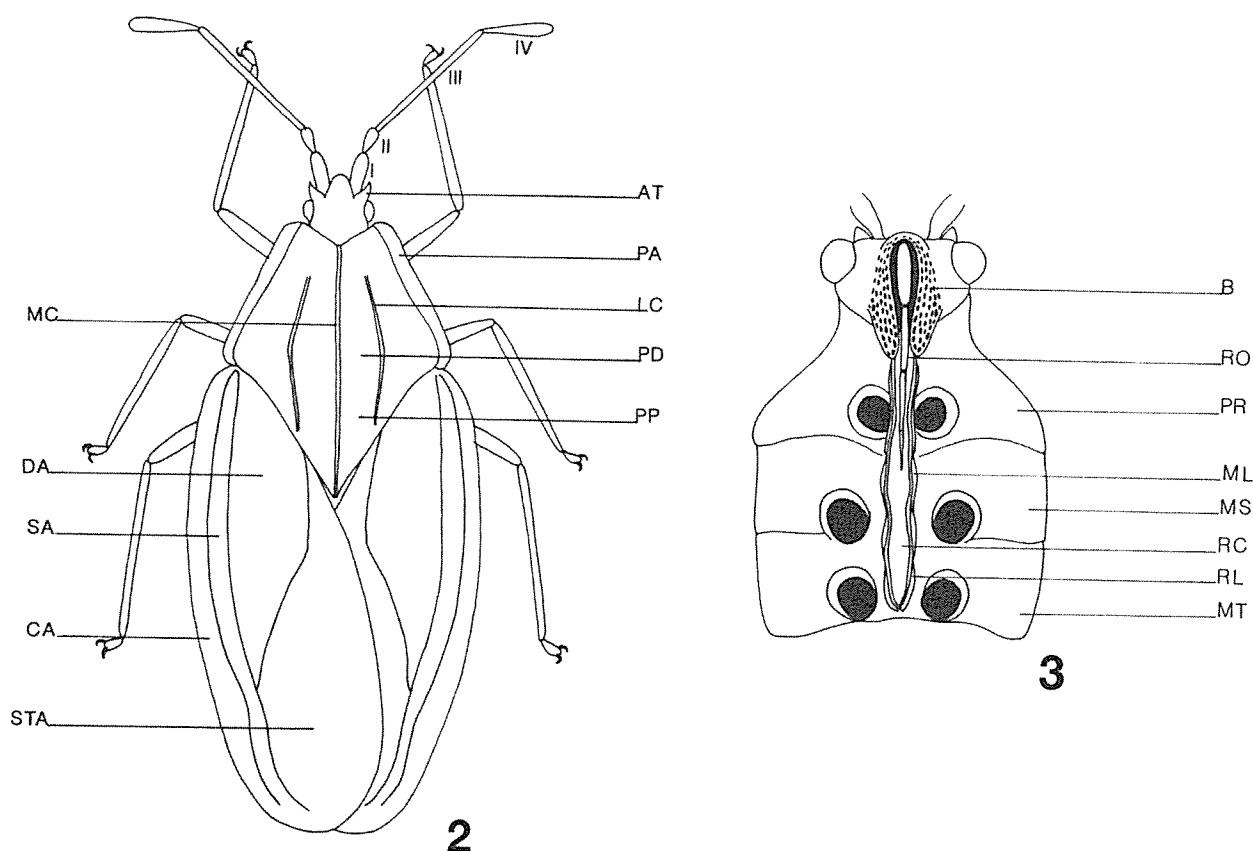
Atheas Champion, 1898: 44.

Type species. *Atheas nigricornis* Champion, 1898. Designated by Van Duzee, 1916: 26

Diagnosis. The members of the genus *Atheas* are characterized by their laterally spiniform antenniferous tubercles, lack of spines on the head, a tricarinate pronotum, very narrow but conspicuous paranota which are mostly uniseriate, lack of a pronotal hood, bucula that is closed anteriorly, and fairly short rostrum that never extends beyond the mesocoxae (Figs. 1, 2 and 3). Other important morphological features include elytra that are generally elongate-ovate or oblong in shape. Costal and subcostal areas are generally narrower than the discoidal area which is elongate, about one-half to two-thirds of the total length of the elytra. The sutural area of each elytron is wide and rounded at the apex. The rostral channel is closed behind. Rostral laminae are carinate to foliaceous, and they are parallel or converging at the middle (Fig. 3). Legs are somewhat elongate and slender, yellowish to dark.

Key to species of *Atheas*

- | | | |
|----|--|---|
| 1. | Length of outer margin of antenniferous tubercle approximately twice the width of antennal segment I..... | 2 |
| — | Length of outer margin of antenniferous tubercle approximately equal to the width of antennal segment I..... | 4 |



Figures 2-3. Genus *Atheas* Champion, general morphological characteristics. Figure 2, dorsal view. Figure 3, head and thorax, ventral view. Legend: I, II, III, IV, antennal segments; AT, antenniferous tubercle; B, buccula; CA, costal area; DA, discoidal area; LC, lateral carina; MC, medium carina; ML, mesosternal laminae; MS, mesosternum; MT, metasternum; PA, paranota; PD, pronotal disc; PP, posterior process; PR, prosternum; RC, rostral channel; RL, rostral laminae; RO, rostrum; SA, subcostal area; STA, sutural area.

- | | | | |
|--------|---|--------|--|
| 2 (1). | Costal area, at widest point just beyond apex of discoidal area, approximately as wide as discoidal area (Brazil) | 5 (4). | Antennal segment III one third black (Fig. 4A) (US) |
| — | <i>placentis</i> Drake and Poor | — | Only basal one-fourth, or less, of antennal segment III dark (sometimes very weakly) (Fig. 4B) |
| — | Costal area, at widest point just beyond apex of discoidal area, approximately twice as wide as discoidal area | 6 (5). | Subcostal area with three to four rows of areolae (US, Mexico) |
| 3 (2). | Antennal segment I almost three times as long as segment II; antennal segment III about three times as long as segment IV (Brazil) .. | — | <i>austroriparius</i> Heidemann |
| — | <i>laetantis</i> Drake and Hambleton | 7 (6). | Discoidal area approximately twice as wide as costal area (US) |
| — | Antennal segment I, twice the length of segment II; antennal segment III twice the length of segment IV (Panama, Brazil) | — | Discoidal area approximately three and one-half times as wide as costal area (US) |
| 4 (1). | Antennal segment III bicolored, brown or black basally, much lighter beyond | 8 (4). | Mesosternal laminae converging at middle; legs yellowish-brown with tarsi dark |
| — | Antennae wholly brown to black | | |

- Mesosternal laminae parallel or subparallel; legs brown to black 11
- 9 (8). Discoidal area approximately three times as wide as costal area; the areolae of the latter uniseriate to briefly biseriate (Mexico)
..... *tristis* Van Duzee
- Discoidal area at least twice as wide as costal area, but never three times as wide 10
- 10 (9). Inner anterior margin of paranota with an elongate cell (Ecuador, Honduras, Guatemala, Mexico, US) *nigricornis* Champion
- Inner anterior margin of paranota with a single row of small cells (Mexico)
..... *mirabilis* Drake
- 11 (8). Costal area nearly twice as wide as subcostal area 12
- Costal and subcostal areas nearly equal in width 13
- 12 (11). Discoidal area approximately as wide as costal area; discoidal area short, extending about one half of total length of the elytron (Brazil)
..... *cearanus* Monte
- Discoidal area approximately one and one-half to two times as wide as costal area; length of discoidal area approximately two-thirds of entire length of elytron (Mexico, Guatemala, El Salvador, Brazil, Bolivia, Paraguay)
..... *fuscipes* Champion
- 13 (11). Elytra dark, concolorous with pronotum (Brazil) *paganus* Drake
- Elytra yellowish, strongly contrasting with blackish pronotum (Brazil)
..... *ornatipes* Drake and Hambleton

Species occurring in Mexico

Atheas austroriparius Heidemann

(Fig. 5)

Atheas austroriparius Heidemann, 1909: 235

Description. Length 2.6 mm; width 1.0 mm. Head black; antenniferous tubercles black, approximately as long as the width of the first antennal segment, robust and pointed, diverging at apex; antennae bicolored, somewhat stout, shorter than distance from apex of the head to the tip of posterior process; antennal segment I black, twice as long as II, stout and somewhat constricted about apical third; antennal segment II stout and black; antennal segment III almost twice as long as IV, somewhat stout, yellowish, except for a brown or dark

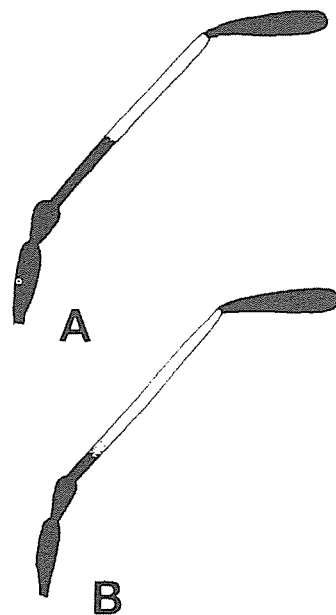


Figure 4. Antennal coloration of, A, *Atheas mimeticus*; B, *Atheas austroriparius*, *A. exiguus*, and *A. insignis*.

band (sometimes inconspicuous) covering about basal one-fourth; antennal segment IV blackish, about as long as I. Pronotum slightly convex, pitted; disc dark, tricarinate; carinae conspicuous, pale; posterior process dark, the tip yellowish and rounded; paranota pale or yellowish, margins somewhat sinuate, anteriorly with two rows of cells, the inner row with very small cells, a single row at humeri; collar dark, concave, and areolate. Elytra with costal area pale, areolae basally uniseriate (some specimens have a brief extra row of minute cells on the outer side) and distinctly biseriate at apex, the areolae subquadrate to rounded; subcostal area triseriate, wider than costal area, areolae rounded, brown to dark; discoidal area narrow, approximately twice as wide as costal area, extending approximately two-thirds of the total length of the elytron, brown to dark; sutural area small, somewhat narrow, hyaline with the nervures dark. Ventral area with buccula black except for pale margins; rostrum scarcely reaching the procoxae; rostral laminae conspicuous; mesosternal laminae parallel. Legs yellowish to light-brown, with the tarsi dark.

Geographic distribution. Mexico, U.S. (FL, GA, MO, MS, SC, TX).

Host plants. *Desmodium* sp., *Schrankia* sp.

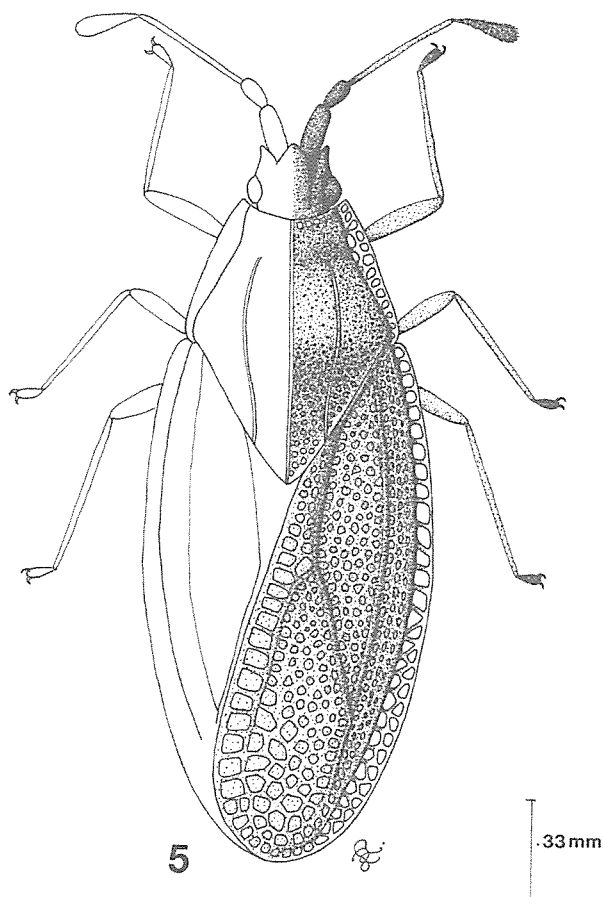


Figure 5. *Atheas austroriparius*, dorsal view.

Comments. There is a brachypterous form that differs from the macropterous form in the following ways: the pronotum is very flat; the costal area is narrower, approximately half the width of the subcostal area, with the areolae very small and inconspicuous at the biseriate portion; the sutural area is reduced and scarcely exceeds the tip of the abdomen.

Atheas austroriparius can be separated from *A. mimeticus*, *A. exiguus* and *A. insignis* by the triseriate subcostal area, which is biseriate in the other three species. The holotype from Columbus, Texas was examined (USNM).

***Atheas fuscipes* Champion**
(Fig. 6)

Atheas fuscipes Champion, 1898: 45

Description. Length 2.5 mm; width 0.9 mm. Head black; antenniferous tubercles black, approximate-

ly as long as the width of first antennal segment, stout and pointed, slightly diverging anterolaterally; antennae black, shorter than distance from apex of head to tip of posterior process, moderately slender; antennal segment I almost as long as II; antennal segment III about two times as long as IV. Pronotum moderately convex, coarsely pitted; disc black, tricarinate; carinae somewhat low, pale to blackish; posterior process subacute, light brown to dark with tip lighter or yellowish, sometimes concolorous; paranota with the areolae anteriorly biseriate (sometimes with an inconspicuous elongate inner cell instead of inner row of cells) to uniseriate at humeri; collar somewhat concave, blackish with margins pale. Elytra with costal area generally biseriate, occasionally triseriate at widest portion, hyaline with nervures pale and infuscate at apex; subcostal area biseriate, dark or brown, about one-half as wide as costal area; discoidal area one-third wider than costal area, extending approximately one-half total length of elytron, dark or brown; sutural area hyaline, the nervures dark. Ventral area with buccula blackish except pale margins; rostrum reaching procoxae; rostral laminae low, rather separated; mesosternal laminae parallel or

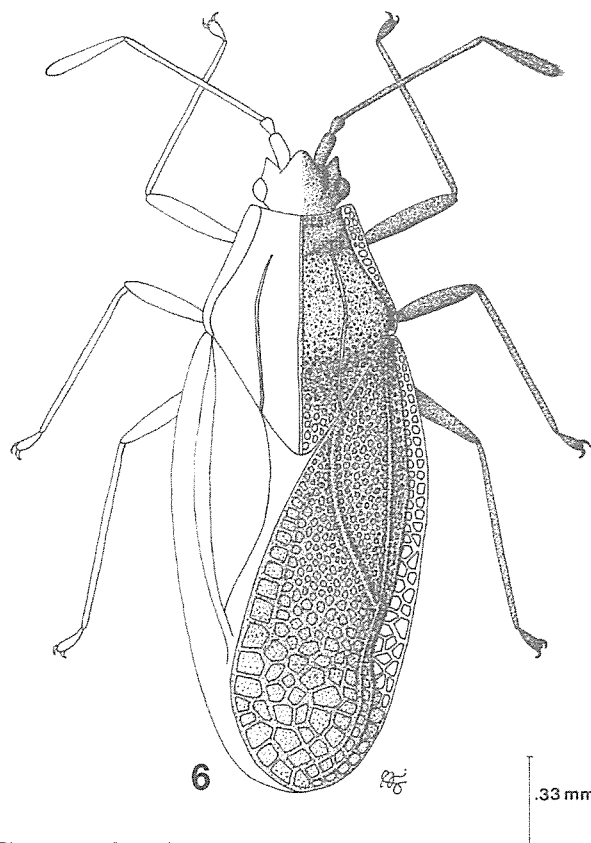


Figure 6. *Atheas fuscipes*, dorsal view.

subparallel. Legs black or dark brown, portions of tibia lighter in some, tarsi black.

Geographic distribution. Mexico (Chis., Gro., Mich., Mor., Nay., Oax., Pue., Tab., Ver), Guatemala, El Salvador, Brazil, Bolivia, Paraguay.

Host plants. *Eupatorium adenophorum*, Fabaceae.

Comments. *Atheas fuscipes* resembles *A. nigricornis* and *A. mirabilis*, but is readily separated from them by the blackish or brown color of the legs. The legs are yellowish or light brown in the other two species. The mesosternal laminae of *A. fuscipes* are parallel or subparallel and widely separated, but are converging at the middle in the other two species. A paratype from Rio Naranjo, Guatemala was examined (USNM).

***Atheas mirabilis* Drake**
(Fig. 7)

Atheas mirabilis Drake, 1938: 70

Description. Length 2.78 mm; width 1.2 mm. Head black, rugulose; antenniferous tubercles black, approximately as long as width of first antennal segment, stout and pointed, slightly directed anterolaterally; antennae blackish, somewhat stout, shorter than distance from the apex of head to tip of the posterior process; antennal segment I stout, constricted in the middle, almost twice as long as II which is also stout; antennal segment III somewhat stout, almost twice as long as IV. Pronotum convex, coarsely pitted; disc black, conspicuously tricarinate; carinae pale; posterior process elongated, pointed, areolate, light brown; paranota narrow, converging anteriorly, yellowish, with the areolae anteriorly biseriate to uniseriate at humeri, the areolae rounded; collar brown, slightly raised and concave in front, areolate. Elytra with costal area rather broad (approximately two-thirds as wide as discoidal area), testaceous, hyaline, usually with two rows of areolae, sometimes triseriate at widest portion, areolae subquadrangular; subcostal area, brown to dark, almost as wide as costal area, biseriate with very small cells; discoidal area approximately one-third wider than costal area, long, extending about two-thirds total length of elytron, infusate, with small and crowded areolae; sutural area hyaline, basally infusate, intermediate portion pale, apex testaceous. Ventral area with buccu-

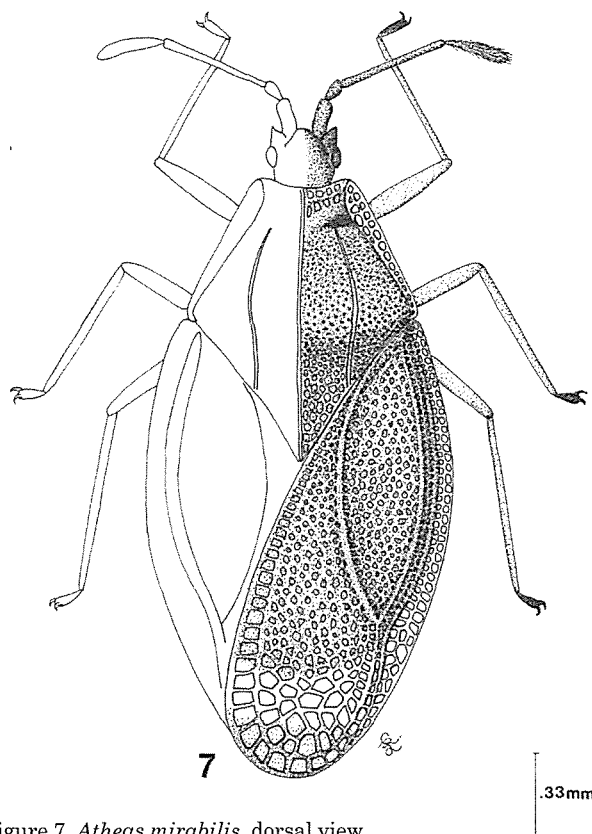


Figure 7. *Atheas mirabilis*, dorsal view.

la black except pale margins; rostrum reaching mesosternum; rostral laminae very conspicuous, yellowish; mesosternal laminae converging at middle. Legs light brown or yellowish-brown, tarsi dark.

Geographic distribution. Mexico (Edo. de Mex., Mich.).

Host plants. unrecorded.

Comments. *Atheas mirabilis* resembles *A. nigricornis*, but can be separated from it by its anteriorly biseriate paranota, which in *A. nigricornis* is anteriorly uniseriate with an inner elongated cell, instead of a second row of areolae. Also, the coloration of the elytra is mostly black in *A. mirabilis*, while it is lighter, from pale to testaceous in *A. nigricornis*. An allotype from Temascaltepec, Estado de Mexico, Mexico, was examined (USNM).

***Atheas nigricornis* Champion**
(Fig. 8)

Atheas nigricornis Champion, 1898: 45

Description. Length 2.5-2.6 mm; width 0.87-0.95 mm. Head black; antenniferous tubercles black, approximately as long as width of the first antennal segment, stout and pointed; antennae blackish, shorter than distance from the apex of head to the tip of posterior process, somewhat slender; antennal segment I almost twice as long as II; antennal segment III slender and twice as long as IV which is also slender. Pronotum moderately convex, coarsely pitted; disc black, conspicuously tricarinate; carinae pale to light brown; posterior process acuminate, varying in color from dark to pale; paranota uniseriately areolate with an elongated inner cell that is sometimes inconspicuous, especially on small specimens, the areolae subquadrate; collar truncate, blackish, with margins lighter, areolate. Elytra mostly pale to yellowish-brown; costal area broad (approximately two-thirds as wide as discoidal area), margins slightly curved, hyaline, slightly lighter than rest of elytron, with two rows of areolae although sometimes seeming to be basally uniseriate, (in some specimens three cells may be present at widest portion); subcostal area narrower than costal area, biseriata with very small cells; discoidal area approximately one-third wider than costal area, extending nearly two-thirds total length of elytron, with very small cells; sutural area sometimes slightly infuscate at apex, areolae hyaline, similar in size and shape to those on costal area. Ventral area with buccula dark with margins pale; rostrum, reaching posterior end of procoxa; rostral laminae conspicuous, margins pale; mesosternal laminae converging at the middle. Legs yellowish-brown with tarsi dark.

Geographic distribution. Mexico (Chis., D.F., Dgo., Edo. Mex., Gro., Hgo., Jal., Mich., Mor., NL., Oax., Ver.), U.S. (AZ, TX), Guatemala to Ecuador.

Host plants. *Alnus acuminata*, *Parosela citriodora*, Bromeliaceae

Comments. *Atheas nigricornis* can be separated from *A. tristis* by the costal area, which is uniseriate in *A. tristis* and biseriata in *A. nigricornis*. Also, the discoidal area is three times as wide as the costal area in *A. tristis*, while in *A. nigricornis* it is one-third wider than the costal area. The darker coloration of the elytra in *A. tristis* also separates them. *Atheas nigricornis* can be separated from *A. mirabilis* by its uniseriately areolate paranota with an elongated inner cell, which in *A. mirabilis* is biseriata. A syntype from Real de Arriba, Temas-

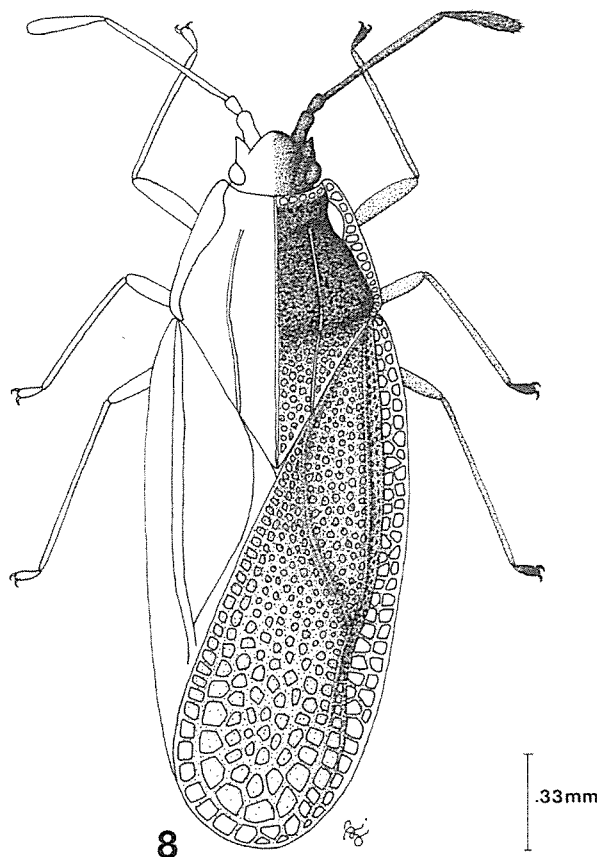


Figure 8. *Atheas nigricornis*, dorsal view.

caltepec, Estado de Mexico, Mexico, was examined (USNM).

***Atheas tristis* Van Duzee**
(Fig. 9)

Atheas tristis Van Duzee, 1923: 143.

Description. Length 2.19-2.3 mm; width 0.76 mm. Head black; antenniferous tubercles black, approximately as long as width of the first antennal segment, stout and subacute; antennae entirely black, shorter than distance from apex of head to tip of triangular process; antennal segment I about twice as long as II; antennal segment III one and one-half to two times as long as IV, both slender. Pronotum moderately convex, coarsely pitted; disc black, tricarinate; carinae low, brown to pale, center portion darker; posterior process acuminate, infuscate to light brown and sometimes yellowish; paranota converging anteriorly with margins slightly sinuate, uniseriate with an elongated inner cell

that is sometimes inconspicuous, areolae somewhat rounded; collar truncate, blackish with margin lighter. Elytra light brown to brown, except costal area lighter or pale; costal area narrow (approximately one-third as wide as discoidal area), with a single row of areolae or two irregularly arranged rows of areolae in part, areolae hyaline, subquadrate and triangular shaped; subcostal area biseriate, about as wide as costal area; discoidal area approximately three times as wide as costal area, extending two-thirds of the total length of the elytron, cells small; sutural area somewhat hyaline, with nervures dark. Ventral area with buccula blackish, except brown margins; rostrum reaching mesosternum; rostral laminae low, with margins pale to fuscous; mesosternal laminae converging at the middle. Legs dark to light brown, with tarsi black.

Geographic distribution. This species has been recorded only from Mexico (B.C., N.L.).

Host plants. *Aeschynomene nivea*, *Yucca* sp.

Comments. *Atheas tristis* resembles *A. nigricornis*, but it can be separated by its narrower costal area that is one-third as wide as the discoidal area. In *A. nigricornis* it is two-thirds as wide as the discoidal area. Also, the costal area is biseriate in *A. nigricornis*. A paratype from Bahia Concepcion, B.C., Mexico was examined (USNM).

Species Not Occurring in Mexico

Atheas cearanus Monte

Atheas cearana Monte, 1947: 430.

Description. Head dark brown; antenniferous tubercles dark brown, approximately as long as width of the first antennal segment, blunt; antennae longer than distance from apex of head to the tip of posterior process, dark brown; antennal segment I twice as long as II; antennal segment III about three times as long as IV; antennal segment IV three times as long as II. Pronotum tricarinate, disc dark brown; posterior process infuscate; paracosta subvertical, biseriate to uniseriate (some specimens have an elongated inner cell with a single marginal row of areolae). Elytra elongate, mostly dark; costal area light and hyaline, broad, twice as wide as subcostal area, with two rows of cells (some

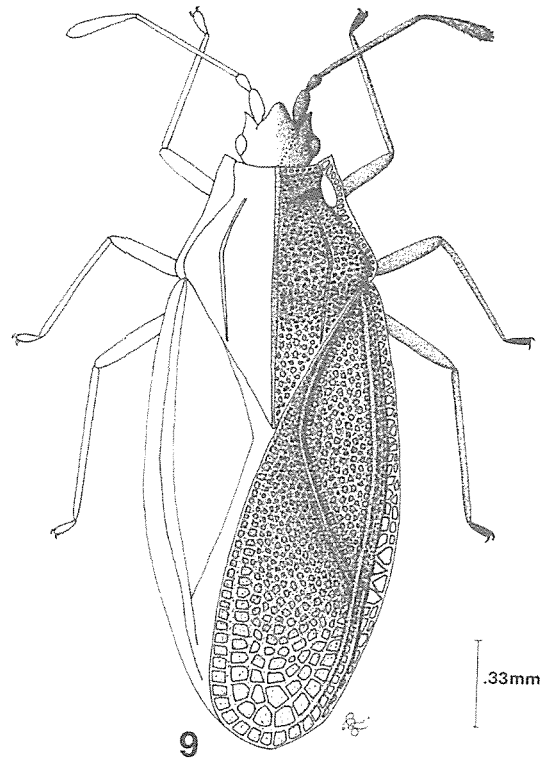


Figure 9. *Atheas tristis*, dorsal view.

specimens with three cells at widest portion); subcostal area biseriate, with same size and form of cells as discoidal area; discoidal area as wide as costal area, extending less than one-half total length of elytron; sutural area elongate, hyaline, with same kind of cells as costal area. Ventral area with rostrum almost reaching the mesocoxae; mesosternal laminae parallel. Legs dark brown, with basal portion of femora lighter.

Geographic distribution. Brazil.

Host plant. *Manihot* sp.

Comments. *Atheas cearanus* resembles *A. flavipes* and *A. placentis*, but it can be separated from them by their longer antenniferous tubercles. These are twice as long as the width of the first antennal segment in *A. flavipes* and *A. placentis*, and as long as the width of the first antennal segment in *A. cearanus*. *Atheas cearanus* can also be separated from *A. flavipes* by the wider costal area, about twice the width of the discoidal area, and from *A. placentis* by the testaceous coloration of the third antennal segment. *Atheas cearanus* also resembles *A. fuscipes*, but it can be separated by its shorter

antennae (shorter than the distance from the apex of the head to the tip of the posterior process) and by the longer discoidal area in *A. fuscipes* (two-thirds of the total length of the elytron). Two paratypes from Baturite, Ceara, Brazil were examined (MNRJ).

Atheas exiguus Heidemann

Atheas exiguus Heidemann, 1909: 233.

Description. Head black; antenniferous tubercles black, approximately as long as width of first antennal segment, pointed; antennae shorter than distance from apex of head to tip of posterior process, bicolored; antennal segment I twice as long as II, both black and somewhat stout; antennal segment III slender, yellowish except for basal dark band; antennal segment IV approximately two-thirds as long as III, blackish. Pronotum tricarinate; disc dark; posterior process yellowish; paranota very narrow, basally uniseriate, with a few minute areolae on inner side. Elytra very narrow, elongate, yellowish; costal area hyaline, very narrow (approximately one-third as wide as width of discoidal area), with a single row of areolae, areolae quadrate, rectangular and sometimes triangular; subcostal area approximately as wide as costal area, biseriate; discoidal area nearly twice as wide as subcostal area, extending almost two-thirds total length of elytron; sutural area hyaline, the nervures light brown to yellowish. Ventral area with rostrum reaching the procoxae; mesosternal laminae parallel. Legs yellowish to testaceous, with tarsi dark.

Geographic distribution. U.S. (FL, MS, TX).

Host plants. unrecorded

Comments. This species can be distinguished from *A. insignis* by the narrowness of the body. Also, the costal area is about one-third as wide as the discoidal area in *A. exiguus*, while in *A. insignis* it is about one-half as wide. The cross-nervures are not dark as in *A. insignis*. *Atheas exiguus* can be distinguished from *A. mimeticus* by the coloration of the third antennal segment, which is black only at the base in *A. exiguus*, while one-third of the segment is black in *A. mimeticus*. A single row of areolae on the costal area of *A. exiguus* also separates it from *A. mimeticus*, which is biseriate. The

holotype from Sevenoaks, FL, U.S. was examined (USNM).

Atheas flavipes Champion

Atheas flavipes Champion, 1898: 45.

Description. Head black; antenniferous tubercles black, length approximately twice the width of first antennal segment, slender, pointed; antennae longer than distance from apex of head to tip of posterior process, brown to black (sometimes bi-colored); antennal segment I approximately twice as long as II, both brown to black; antennal segment III almost twice as long as IV, brown to black, sometimes flavous; antennal segment IV twice as long as I, blackish. Pronotum tricarinate; disc black to testaceous towards the posterior process which is mainly testaceous; paranota subvertical, hyaline, uniseriate with an elongated inner cell. Elytra elongate, brownish, except for the costal area; costal area pale, hyaline, biseriate to triseriate, two to three times the width of the subcostal area; subcostal area very narrow, biseriate, brownish; discoidal area brown, approximately half as wide as costal area, extending approximately half total length of elytron; sutural area hyaline, with nervures usually brown. Ventral area with mesosternal laminae parallel, rather separated. Legs flavo-testaceous with tarsi dark.

Geographic distribution. Panama, Brazil.

Host plant. *Machaerium angustifolium*.

Comments. This species resembles *A. placentis*, but can be separated by the costal area which is twice as wide as the discoidal area in *A. flavipes* but approximately of the same width in *A. placentis*. Also, the coloration of the third antennal segment which is concolorous in *A. flavipes* but testaceous to yellowish with a basal black band in *A. placentis*. *Atheas flavipes* can be separated from *A. fuscipes* by the length of the antennae which are longer than the distance from the apex of the head to the tip of the posterior process in *A. flavipes* but shorter in *A. fuscipes*. Also, in *A. flavipes*, the length of the antenniferous tubercles is approximately twice the width of the first antennal segment (nearly the same in *A. fuscipes*). The leg coloration, which is dark in *A. fuscipes* and yellowish in *A. flavipes*, also separates them. A paratype from Bugaba, Panama, was examined (USNM).

Atheas insignis Heidemann

Atheas insignis Heidemann, 1909: 232.

Description. Head black; antenniferous tubercles black, pointed and diverging at apex, approximately as long as width of first antennal segment; antennae shorter than distance from apex of head to tip of posterior process, bicolored; antennal segment I twice as long as II, both black and stout; antennal segment III nearly twice as long as IV, yellowish with a short black basal band; antennal segment IV black and stout. Pronotum tricarinate; disc black; posterior process infusate, with apex yellowish or pale; paranota narrow, uniseriate, with an additional short row of inner areolae, sometimes with only two or three areolae. Elytra somewhat narrow, light brown with cross nervures dark, margins sinuate; costal area uniseriate with cells very large (some larger than length of second antennal segment) except for a few additional smaller cells near lateral margins, irregular shape and arrangement, with nervures dark; subcostal area biseriate, almost half as wide as costal area; discoidal area approximately twice as wide as costal area, extending almost two-thirds the total length of elytron; sutural area hyaline with nervures dark and cells similar to those on costal area. Ventral area with rostrum reaching the procoxae; mesosternal laminae slightly converging at middle, especially on females. Legs yellowish with tarsi black.

Geographic distribution. U.S. (DC, MD, MS, VA).

Host plants. *Desmodium* sp., *Stylosantes biflora*.

Comments. This species can be separated from *Atheas mimeticus* by the coloration of the antennae. Only a black basal band in *A. insignis* while in *A. mimeticus* one-third of the third antennal segment is black. The wider costal area (one-half the width of the discoidal area) of *Atheas insignis* separates it from *A. exiguus* (one-third the width of the discoidal area). The holotype from Blandensburg, MD, U.S. was examined (USNM).

Atheas laetantis Drake and Hambleton

Atheas laetantis Drake and Hambleton, 1944: 124.

Description. Head black; antenniferous tubercles dark brown with the tips testaceous to pale, length approximately twice the width of first antennal segment, slender, pointed; antennae longer than distance from apex of head to tip of posterior process, brown to black; antennal segment I almost three times as long as II, blackish; antennal segment II brownish; antennal segment III approximately three times as long as IV, testaceous; antennal segment IV black. Pronotum tricarinate, brown to black; posterior process brownish; paranota wide, hyaline, uniseriate, anteriorly with an elongate inner cell. Elytra wide, hyaline; costal area with two to three rows of cells at widest portion, cells mostly quadrate, very large, sometimes as long as first antennal segment, nervures pale; subcostal area biseriate, approximately one-third as wide as costal area, nervures brownish; discoidal area one-half as wide as costal area, extending less than one-half total length of elytron, nervures brownish; sutural area wide, with cells similar to those on costal area, with nervures mostly pale but basally brownish. Ventral area with rostrum surpassing the procoxae; mesosternal laminae subparallel. Legs testaceous to yellowish with tarsi infusate.

Geographic distribution. Brazil.

Host plants. *Machaerium angustifolium*, *Machaerium* sp.

Comments. This species can be separated from *A. flavipes* and *A. placentis* by its longer first and third antennal segments. In *A. laetantis*, the length of I is almost three times that of II, and the length of III is approximately three times that of IV. In *A. flavipes* and *A. placentis*, the length of I is twice that of II, and the length of III is nearly twice that of IV. The yellowish to testaceous color of the legs separates *A. laetantis* from *A. fuscipes*, where the legs are brown to black; also, the antennae are shorter than the distance from the apex of the head to the tip of the posterior process in *A. fuscipes*. Several paratypes from Viçosa, Minas Gerais, Brazil, were examined (USNM).

Atheas mimeticus Heidemann

Atheas mimeticus Heidemann, 1909: 234.

Atheas annulatus Osborn and Drake, 1917: 295.

Synonymized by Hurd, 1946: 460.

Atheas sordidus Osborn and Drake, 1917: 296.
Synonymized by Hurd, 1946: 460.

Description. Head black; antenniferous tubercles black, pointed, approximately as long as width of first antennal segment; antennae longer than distance from apex of head to tip of posterior process, bicolored; antennal segment I twice as long as II, both black; antennal segment III nearly twice as long as IV, yellowish with basal third black; antennal segment IV black. Pronotum tricarinate, black, except towards the apex where it is yellowish; paranota uniseriate, sometimes with a short inconspicuous inner row of areolae. Elytra elongate, yellowish-brown; costal area pale, the inner side of nervures dark, biseriate, cells of outer row very small; subcostal area biseriate, width approximately equal to that of costal area; discoidal area twice as wide as costal area, extending almost two-thirds total length of elytron, inner and outer nervures brown to black; sutural area hyaline, nervures brownish, cells similar to those ones on costal area. Ventral area with rostrum reaching the procoxae; mesosternal laminae parallel or subparallel. Legs yellowish, with brown markings on ventral side of femora, with tarsi infusate.

Geographic distribution. U.S. (AR, CO, FL, IA, KS, LA, MN, MS, MO, NB, NM, WI, WY).

Host plants. *Desmodium* sp., *Petalostemum purpureum*.

Comments. There is a brachypterous form of this species that differs from the macropterous form in the following ways: the elytra are shorter, scarcely surpassing the abdomen; the antennae are shorter than the distance from the apex of the head to the tip of the posterior process; the costal area is reduced and generally with a single row of areolae. *Atheas mimeticus* can be separated from *A. austruiparius*, *A. exiguus* and *A. insignis* by the third antennal segment which is one-third black in *A. mimeticus*, but only with a black basal band in the three other species. A paratype from Ames, IA, U.S. was examined (USNM).

Atheas ornatipes Drake and Hambleton

Atheas ornatipes Drake and Hambleton, 1935: 143.

Description. Head black; antenniferous tubercles black, blunt, approximately as long as width of first antennal segment; antennae shorter than distance from apex of head to tip of posterior process, brown; antennal segment I twice as long as II, both stout; antennal segment III almost twice as long as IV. Pronotum tricarinate; disc brownish; posterior process yellowish to pale towards apex; paranota hyaline, uniseriate with one or two large inner cells. Elytra hyaline; nervures yellowish, unicolorous; costal area uniseriate to biseriate at widest part; subcostal area approximately as wide as costal area, biseriate, with minute areolae; discoidal area approximately twice as wide as costal area, extending nearly two-thirds of total length of elytron; sutural area hyaline, with areolae similar to those on costal area. Ventral area with rostrum reaching the procoxae; mesosternal laminae rather separated, subparallel. Legs bicolored; femora black to brown; tibiae light brown; tarsi infusate.

Geographic distribution. Brazil.

Host plant. *Aeschynomene falcata*.

Comments. This species can be easily separated from *A. nigricornis* by the mesosternal laminae which converge at the middle in *A. nigricornis*, but are parallel and rather separated in *A. ornatipes*. Several paratypes from Sao Paulo, Brazil were examined (USNM).

Atheas paganus Drake

Atheas paganus Drake, 1942: 15.

Description. Head black; antenniferous tubercles black, blunt, approximately as long as width of first antennal segment; antennae shorter than distance from apex of head to tip of posterior process, brown to black; antennal segment I approximately as wide as II; antennal segment III approximately twice as long as IV. Pronotum tricarinate; disc and posterior process brown to black; paranota light brown to dark, uniseriate, with one to three inner areolae (sometimes inconspicuous). Elytra mostly dark; costal area biseriate to uniseriate towards apex, hyaline, with nervures mostly dark; subcostal area approximately as wide as costal area, biseriate, brown to black; discoidal area approximately twice as wide as costal area, extending approximately one-half total length of elytron, hyaline with ner-

vures dark; sutural area hyaline with nervures dark, with large cells, some as large as twice the size of those in costal area. Ventral area with rostrum reaching mesosternum; mesosternal laminae subparallel. Legs brown to black; tibia sometimes lighter; tarsi black.

Geographic distribution. Brazil.

Host plant. *Aeschynomene* sp.

Comments. This species is very similar to *A. fuscipes*. However, the costal area is approximately twice as wide as the subcostal area in *A. fuscipes*, while in *A. paganus* it is of approximately the same width. Also, the width of the discoidal area is twice that of the costal area in *A. paganus*, while in *A. fuscipes* it is one-third wider. Moreover, the coloration of the nervures of the costal area is blackish in *A. paganus*, but pale to yellowish in *A. fuscipes*. The allotype from Viçosa, Minas Gerais, Brazil, was examined (USNM).

Atheas placentis Drake and Poor

Atheas placentis Drake and Poor, 1940: 226.

Description. Head black; antenniferous tubercles black, pointed, approximately twice as wide as first antennal segment; antennae longer than distance from apex of head to tip of posterior process, bicolored; antennal segment I twice as long as II, both blackish; antennal segment III two to two and one-half times as long as IV, yellowish to testaceous, darker basally; antennal segment IV blackish. Pronotum tricarinate; disc brown to black; posterior process testaceous to pale at apex; paranota wide, hyaline, uniseriate with a large inner cell. Elytra hyaline; costal area nearly twice as wide as subcostal area, mostly biseriate with three cells at widest portion, with nervures pale; subcostal area biseriate, brownish; discoidal area approximately as wide as costal area, extending one-half of total length of elytron, brown to black; sutural area hyaline with nervures dark. Ventral area with rostrum reaching mesosternum; mesosternal laminae subparallel, rather separated. Legs yellow, with the tarsi infusate.

Geographic distribution. Brazil.

Host plants. *Celtis brasiliensis*

Comments. This species is very similar to *A. flavipes*, but can be separated from it by the coloration of the III antennal segment, which is unicolorous and either black or flavous in *A. flavipes*. In *A. placentis* it is yellowish with a dark basal band. Also, the costal area is approximately twice as wide as the discoidal area in *A. flavipes*, while in *A. placentis* it is approximately equal in width. The yellowish color of the legs and the bicolored antennae in *A. placentis* separate it from *A. fuscipes* which has legs and antennae that are wholly brown to black. A paratype from Bello Horizonte, Minas Gerais, Brazil, was examined (USNM).

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Literature cited

- Bailey, L.H.** 1949. Manual of cultivated plants. The McMillan Co., Toronto, Ontario, Canada. 1116 pp.
- Banks, N.** 1910. Catalogue of the Nearctic Hemiptera-Heteroptera. Amer. Ent. Soc., Philadelphia. 103 pp.
- Barber, H.G.** 1914. Insects of Florida. 11. Hemiptera. Bull. Amer. Mus. Nat. Hist. 33: 495-535.
- Beshear, R.J., H.H. Tippins and J.O. Howell.** 1976. The lacebugs (Tingidae) of Georgia. Georgia Ag. Exp. Sta. Res. Bull. 188:1-29.
- Blatchley, W.S.** 1926. Heteroptera or true bugs of eastern North America, with especial references to the faunas of Indiana and Florida. Nature Publ. Co., Indianapolis. 1116 pp.
- Brailovsky, H. and L. Torres.** 1986. Hemiptera-Heteroptera de Mexico XXXVI. Revisión genéri-

- ca de la familia Tingidae Laporte. An. Inst. Biol. Univ. Nal. Auton. Méx. Ser. Zool. 56(3): 869-932.
- Champion, G.C.** 1898. Insecta: Rhynchota (Hemiptera: Heteroptera). Volume II. In Goodwin and Salvin (editors). Biologia Centrali-Americana. London. 33-193 pp.
- De Costa Lima, A.M.** 1936. Terceiro catalogo dos insectos que vivem nas plantas do Brasil. Rio de Janeiro. 460 pp.
- Drake, C.J.** 1925. Concerning some Tingitidae from the Gulf States (Heteroptera). Florida Ent. 9: 36-39.
- Drake, C.J.** 1938. Mexican Tingitidae (Hemiptera). Pan-Pacific Ent. 14 (2): 70-72.
- Drake, C.J.** 1942. New Tingitidae (Hemiptera). Iowa State Coll. Journ. Sci. 17 (1): 1-21.
- Drake, C.J. and E.J. Hambleton.** 1934. Brazilian Tingitidae (Hemiptera). Part I. Revista Ent., Rio de Janeiro 4 (4): 435-451.
- Drake, C.J. and E.J. Hambleton** 1935. New Brazilian Tingitidae (Hemiptera). Part II. Arch. Inst. Biol., Sao Paulo 6 (16): 141-154.
- Drake, C.J. and E.J. Hambleton** 1938. Concerning Brazilian Tingitidae (Hemiptera). Part III. Revista Ent. Rio de Janeiro 8 (1-2): 44-68.
- Drake, C.J. and E.J. Hambleton** 1944. Concerning Neotropical Tingitidae (Hemiptera). J. Washington Acad. Sci. 34 (4): 120-129.
- Drake, C.J. and M.E. Poor.** 1940. Six new South American Tingitidae (Hemiptera). Revista Ent., Rio de Janeiro 11 (1-2): 226-231.
- Drake, C.J. and F.A. Ruhoff.** 1960. Lace-bug genera of the world (Hemiptera: Tingidae). Proc. U.S. Nat. Mus. 112: 1-105.
- Drake, C.J. and F.A. Ruhoff.** 1965. Lacebugs of the world: a catalog (Hemiptera: Tingidae). U.S. Nat. Mus. Bull. 243. 634 pp.
- Froeschner, R.C.** 1944. Contributions to a synopsis of the Hemiptera of Missouri, Part III. Amer. Midl. Nat. 31 (3): 638-683.
- Heidemann, O.** 1909. New species of Tingitidae and description of a new *Leptoglossus* (Hemiptera-Heteroptera). Bull. Buffalo Soc. Nat. Sci., vol. 9: 231-238.
- Henry, T.J., and R.C. Froeschner, (editors).** 1988. Catalog of the Heteroptera, or True Bugs, of Canada and the Continental United States. E. J. Brill, Leiden. 958 pp.
- Hurd, M.P.** 1946. Generic classification of North American Tingitidae (Hemiptera: Heteroptera). Iowa State Coll. Journ. Sci. 20 (4): 460.
- McAtee, W.L.** 1923. Tingitidae of the vicinity of Washington D.C. (Heteroptera). Proc. Ent. Soc. Washington 25 (7-8): 143-151.
- Miller, L.R.** 1992. A key to the genus *Atheas* Champion (Heteroptera: Tingidae) including a revision of the Mexican species. Master Thesis, submitted April, 1992. Marshall University, Huntington, WV. USA.
- Monte, O.** 1939. Lista preliminar dos tingitideos de Minas Gerais. Revista Soc. Brasileira de Agronomia 2(1): 63-87.
- Monte, O.** 1941. Catalogo dos tingitideos do Brazil. Arqu. Zool., Sao Paulo 2 (3): 65-174.
- Monte, O.** 1947. Sobre tingitideos Americanos com descricoes de especies novas (Hem.) Revista Ent., vol. 18(3): 429-432.
- Osborn, H. and C.J. Drake.** 1915. Records of Guatemalan Hemiptera-Heteroptera with descriptions of new species. Ohio Nat. 15 (8): 529-541.
- Osborn, H. and C.J. Drake.** 1917. Notes on American Tingidae with descriptions of new species. Ohio Journ. Sci. 17 (8): 295-307.
- Slater, J.A. and R.M. Baranowsky.** 1978. How to know the true bugs (Hemiptera: Heteroptera). Pictured Key Nature Series. Wm.C. Brown Co. Pub., Dubuque, Iowa. 256 pp.
- Van Duzee, E.P.** 1916. Check list of the Hemiptera (excepting the Aphididae, Aleurodidae and Coccidae) of America, north of Mexico. N.Y. Ent. Soc. 111 pp.
- Van Duzee, E.P.** 1917. Catalogue of the Hemiptera of America north of Mexico excepting the Aphididae, Coccidae and Aleurodidae. Univ. California Publ., Tech. Bull. 2. 902 pp.
- Van Duzee, E.P.** 1923. Expedition of the California Academy of Sciences to the Gulf of California in 1921. Hemiptera (true bugs, etc.). Proc. California Acad. Sci., ser. 4. 12(11): 123-200.