Ventral tube with 1 or 1 setae
Tenaculum 3 or 3 teeth
Dens with 4 setae
Mucro with narrow lamellae
Long posterior setae acuminate

With 5 or 6 + 0 setae
With 4 + 4 teeth
With 6 setae
With large, broad lamellae
Setae truncate or weakly clavate

In addition, on the 4th antennal segment, P. curtus has a ventral "file" which is lacking in P. quadrisetosus.

TYPES: Holotype (male) and 1 paratype on slides; 1 additional paratype in alcohol. Holotype and paratypes are deposited in the Entomology Museum, Michigan State University. All specimens were collected in Florida, Lee County, junction of SR 82 and SR 82a, in a pond on Nymphaea odorata Ait., 13-III-1978, E. S. Del Fosse, collector.

ACKNOWLEDGMENTS

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LITERATURE CITED


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THE DISTRIBUTION AND SYSTEMATICS OF OZOPHORA ATROPICTA BARBER, WITH THE DESCRIPTION OF A NEW SPECIES FROM THE NEOTROPICS

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ABSTRACT

The distribution and geographic variation of Ozophora atropicta Barber is analyzed. A discussion is given of the likelihood of the present distribution being due to dispersal, vicariance or a combination of the above. Ozophora heydorni Barber and Ashlock is considered a junior synonym of atropicta. Ozophora parapicta is described as a new species from Central and South America. The 5th instar nymph of the latter is briefly described and compared with that of Ozophora concava Distant.

Charts and graphs of intraspecific variation in atropicta are included as is a dorsal view illustration of atropicta and figures of the male genitalia of both species.

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1This work was supported by a grant from the National Science Foundation.
Se analizan la distribución y la variación geográfica de *Ozophora atropicta* Barber. Se discute la posibilidad que la distribución actual se debe a la dispersión o a la disyunción o a una combinación de las dos factores. *Ozophora heydoni* Barber & Ashlock se considera un sinónimo junior de *O. atropicta*. *Ozophora parapicta* se describe como una especie nueva de América Central y América del Sur. El 5º instar de la ninfa del anterior se describe brevemente y se lo compara con la de *O. concava* Distant.

Se incluyen cartas y gráficos de la variación intraspecífica en *O. atropicta*, un dibujo de la vista dorsal de *O. atropicta*, y dibujos de las genitalias de los machos de ambas especies.

The status of *Ozophora* populations in the West Indies is a difficult taxonomic problem. The present paper deals with one aspect of this—the status of the 2 nominal species *atropicta* and *heydoni*. This taxonomic situation is complicated by a nomenclatural problem involving the type series. In addition a new related species from Central and South America is described.

In the following discussion, we synonymize *heydoni* with *atropicta* and discuss in detail the distribution and variation of the latter.

*Ozophora atropicta* was described by Barber (1939) from Puerto Rico, Hispaniola, and Andros Island in the Bahamas. It was later reported by Ramos (1946) from Mona I., by Barber (1954) from Cuba, by Scudder (1955) from the Caymans and by Barber and Ashlock (1960) from many islands in the Bahamas and from the Turks and Caicos (the Slater 1964 Catalogue is in error regarding the distribution given in this latter paper). *Ozophora heydoni* was originally described by Barber and Ashlock (1960) from New Providence Island, the Abaco Cays, Great Abaco I., and Andros Island (all in the Bahamas). It apparently has not been reported subsequently in the literature.

Unfortunately the type series of *atropicta* is mixed. The holotype from Puerto Rico and 3 of the paratypes from the Dominican Republic (San Lorenzo (1), Sanchez (2)) are conspecific with the holotype (and all of the rest of the type series) of *heydoni*. The remaining paratypes of *atropicta* represent at least one quite distinct species. Thus, *heydoni* Barber and Ashlock becomes a junior synonym of *atropicta* Barber. What we discuss in the present paper as *atropicta* is, therefore, in the old sense of *heydoni*.

The status of the remaining material that has previously been called *atropicta* is beyond the scope of this paper but we will comment on it briefly. Material from the Upper Bahamas (Great Abaco) as well as from Florida represents an undescribed species which is being treated in a separate paper by K. M. Baranowski and the senior author on the *Ozophora* of Florida. Material from the Turks and Caicos, Fortune I. and Mayaguana is, as noted by Barber and Ashlock (1960), very distinctly colored and may prove to represent another undescribed species. Specimens from the Greater Antilles all appear to represent still an additional species. We have not examined material of this complex from the Caymans so cannot comment on Scudder's record other than to note that *pallidofemora* Scudder and *fuscofemora* Scudder described from the Cayman's are quite distinct from any of the above.

*Ozophora atropicta* (=*heydoni*) as now restricted has a much more extensive range than has previously been suspected. It not only occurs in the
Fig. 1. *Ozophora atropieta* Barber—Dorsal view.

West Indies and Bahamas but in Central and South America as well. (As discussed below it apparently does not occur on Jamaica, nor in the Lesser Antilles). Over this extensive range there is a great deal of variation in size, color and relative proportions. Despite this the genitalia, which usually are reliable indicators of specific status in *Ozophora*, do not differ significantly and thus a single species appears to be involved (Fig. 2, 4).

Specimens from the Bahamas are relatively small and tend to be pale colored, sometimes the posterior pronotal lobe is nearly uniformly yellowish with the pronotal calli reddish brown and with the dark areas of the hemelytra covering much less of the total wing surface than do the pale
areas. Specimens from Cuba are also small and often as pale as are those from the Bahamas, but frequently the posterior pronotal lobe is suffused with dark coloration and most specimens have more extensive dark hemelytral markings. Somewhat surprisingly specimens from Hispaniola are appreciably larger and darker than other specimens from the West Indies (Fig. 6). Specimens from Puerto Rico resemble those from Hispaniola more closely in color than they do material examined from Cuba.

Mainland specimens are generally large (Fig. 6) and dark, but there is a great deal of individual variation. Nevertheless, the difference in appearance is appreciable and if one compares a large dark Trinidad or Mexican specimen with a small pale Bahaman or Cuban one it is difficult to believe that they represent the same species. Mainland populations also have proportionately longer antennae (Fig. 7, 8).

Bahaman and Cuban specimens have a noticeably longer labium than do
mainland specimens. In the former the labium exceeds the posterior margin of the metacoxae and may reach well into abdominal sternum 2. In mainland populations the labium extends at most only between the metacoxae. Interestingly, Hispaniolan specimens have a relatively shorter labium and thus, in this respect, are similar to the mainland, rather than other West Indies material.

The number of fore femoral spines is variable. Some specimens have 3 spines on a fore femur and others have 4. The condition is not always the same on the 2 femora of the same specimen. While numbers of individuals available from most areas is small and it is possible that 3-spined and 4-spined conditions are equally common (see Hispaniola and Trinidad Columns, Fig. 9) available data suggests otherwise. Specimens from the West Indies tend to show a significantly higher proportion of individuals that have 3 spines than do those from the mainland (Fig. 9).

All of the data plus the series of measurements (Table 1, 2) indicates that West Indies population are, as one might expect, more similar to one another in most respects than any of them are to a mainland population.

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1 In Fig 6, 7, 8 "N" numbers are given in Fig. 10 and diagrams show (a) mean (vertical central line), (b) range (horizontal line), (c) one standard deviation (horizontal box).
What is unexpected is that the Hispaniolan population is more similar, in size, color, antennal, and labial length to the mainland populations than it is to Cuban. Today situations such as this must be considered from alternate viewpoints. Are the population differences found in *Ozophora* likely to be the result of a dispersal phenomenon, a vicariant phenomenon, or a combination of both? We believe the species is a good example of how information can be used to arrive at a “most probable” hypothesis where a “3 taxon” statement is not available.

For the present situation to have resulted entirely from dispersal across a water barrier probably 4 (or 5) dispersal events would have had to have taken place. Three of these would be minor dispersals (Cuba to the Bahamas; Hispaniola to Puerto Rico, or the reverse) and 2 major (Mainland to Cuba; Mainland to Hispaniola). It can, of course, be argued with some credibility that only a single major dispersal event need have occurred, resulting in the establishment of an ancestral population on Hispaniola which subsequently reached Cuba and differentiated there. Given the nature of the winds of great force and speed that periodically sweep over the islands it can be argued that dispersal of small insects is a sweepstakes situation with nearly as much chance for a population to be established on Hispaniola as on Cuba even though the latter is nearer to a potential mainland source area.
Fig. 8. Comparison of ratio of length of third antennal segment to interocular space in females of various populations of O. atropicta.

With a dispersal theory there seems to be no way to differentiate between 2 alternate possibilities. (1) An original dispersal event that established a population on Cuba which then differentiated and subsequently dispersed through the Bahamas. Subsequent to the differentiation on Cuba a 2nd dispersal event occurred which established (from the mainland) a population on Hispaniola which then differentiated slightly and dispersed to Puerto Rico. This dispersal hypothesis would attribute the greater similarity of Hispaniolan specimens to those on the mainland to its relatively recent arrival there as compared to the population on Cuba. (2) An alternative dispersal hypothesis would be that an original dispersal event established a population on Hispaniola. After this population had differentiated, a dispersal event occurred from Hispaniola that established a population on Cuba that further differentiated and dispersed to the Bahamas. This latter hypothesis would consider the Hispaniolan population as ancestral on the islands because it is most similar to those on the mainland. Its plausibility would, of course, be based upon the progressive restriction of the gene pool as successive propagules dispersed and established new populations each of which possessed only a portion of the original genetic variability.
Fig. 9. Proportion of population showing 3 forefemoral spines in Ozophora atropicta.

The principal argument against either dispersal option is where atropicta is not found. It seems difficult to believe that had atropicta been able to at least reach Hispaniola or Puerto Rico and subsequently disperse to the other islands, that it should be completely absent from Jamaica and the Lesser Antilles. Yet this seems to be the case. The absence of atropicta from Jamaica is particularly important. The island is varied ecologically and has a rich Ozophora fauna, of which several species also occur on Cuba and Hispaniola. Furthermore, this island has been collected far more intensively for Ozophora species than have any of the islands upon which atropicta occurs. Although we recognize the danger of unequivocally stating that an insect such as this is absent from a large island such as Jamaica we find it hard to believe that if it does occur there (especially given its proclivity for coming to lights), that not a single example would be known. This is true especially since the
### TABLE 1. Measurements of selecte parts of the head and thorax for specimens of *Oxiphora atropiata* collected from several areas in the Caribbean.

<table>
<thead>
<tr>
<th>Locality</th>
<th>N</th>
<th>Sex</th>
<th>Length head</th>
<th>Width Head</th>
<th>Interocular distance</th>
<th>Length Pronotum</th>
<th>Width Pronotum</th>
<th>Length Scutellum</th>
<th>Width Scutellum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bahamas</td>
<td>5</td>
<td>♂</td>
<td>0.81 (1.79-6.82)</td>
<td>0.86 (0.86-6.52)</td>
<td>0.39 (0.36-0.44)</td>
<td>0.82 (0.72-0.81)</td>
<td>1.33 (1.21-1.40)</td>
<td>0.81 (0.75-0.85)</td>
<td>0.71 (0.65-0.78)</td>
</tr>
<tr>
<td>Cuba</td>
<td>12</td>
<td>♂</td>
<td>0.84 (1.78-6.50)</td>
<td>0.89 (0.80-0.90)</td>
<td>0.38 (0.34-0.40)</td>
<td>0.85 (0.80-0.91)</td>
<td>1.34 (1.25-1.51)</td>
<td>0.82 (0.86-1.00)</td>
<td>0.76 (0.68-0.85)</td>
</tr>
<tr>
<td>Hispaniola</td>
<td>6</td>
<td>♂</td>
<td>0.83 (1.78-6.35)</td>
<td>0.96 (0.90-1.03)</td>
<td>0.42 (0.35-0.45)</td>
<td>0.87 (0.80-0.91)</td>
<td>1.33 (1.21-1.45)</td>
<td>0.81 (0.76-1.00)</td>
<td>0.75 (0.68-0.88)</td>
</tr>
<tr>
<td>Honduras</td>
<td>6</td>
<td>♂</td>
<td>0.81 (1.75-6.59)</td>
<td>0.99 (0.85-1.28)</td>
<td>0.44 (0.40-0.49)</td>
<td>0.84 (0.80-0.91)</td>
<td>1.34 (1.43-1.55)</td>
<td>0.93 (0.85-0.92)</td>
<td>0.76 (0.67-0.89)</td>
</tr>
<tr>
<td>Panama</td>
<td>10</td>
<td>♂</td>
<td>0.83 (1.74-6.10)</td>
<td>1.08 (1.05-1.11)</td>
<td>0.48 (0.45-0.51)</td>
<td>1.45 (1.63-1.65)</td>
<td>1.55 (1.55-1.85)</td>
<td>1.05 (0.76-1.25)</td>
<td>0.86 (0.78-1.12)</td>
</tr>
<tr>
<td>Trinidad</td>
<td>7</td>
<td>♂</td>
<td>0.80 (1.79-6.10)</td>
<td>1.10 (1.08-1.15)</td>
<td>0.44 (0.40-0.45)</td>
<td>1.45 (1.64-1.85)</td>
<td>1.73 (1.65-1.85)</td>
<td>1.11 (1.05-1.25)</td>
<td>0.88 (0.74-1.15)</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>♂</td>
<td>0.76 (1.73-6.10)</td>
<td>1.07 (1.06-1.10)</td>
<td>0.46 (0.40-0.48)</td>
<td>1.45 (1.64-1.92)</td>
<td>1.82 (1.73-1.93)</td>
<td>1.12 (1.05-1.23)</td>
<td>1.08 (0.95-1.15)</td>
</tr>
</tbody>
</table>

### TABLE 2. Measurements of *Oxiphora atropiata* collected from various areas in the Caribbean.

<table>
<thead>
<tr>
<th>Locality</th>
<th>Length labial segments (I, II, III, IV)</th>
<th>Length antenna segments (I, II, IV)</th>
<th>Total length (I, II, IV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bahamas</td>
<td>0.66 (0.65-0.90)</td>
<td>0.81 (1.78-6.84)</td>
<td>0.72 (0.69-0.75)</td>
</tr>
<tr>
<td>Cuba</td>
<td>0.92 (0.89-1.00)</td>
<td>0.86 (1.83-0.89)</td>
<td>0.75 (0.68-0.83)</td>
</tr>
<tr>
<td>Hispaniola</td>
<td>0.89 (0.85-0.98)</td>
<td>0.82 (0.85-0.88)</td>
<td>0.68 (0.65-0.72)</td>
</tr>
<tr>
<td>Honduras</td>
<td>0.92 (0.98-1.00)</td>
<td>0.92 (0.90-0.95)</td>
<td>0.73 (0.73)</td>
</tr>
<tr>
<td>Panama</td>
<td>0.97 (0.94-1.03)</td>
<td>0.97 (0.91-0.95)</td>
<td>0.75 (0.69-0.83)</td>
</tr>
<tr>
<td>Trinidad</td>
<td>0.97 (0.94-1.03)</td>
<td>0.97 (0.91-0.95)</td>
<td>0.75 (0.69-0.83)</td>
</tr>
</tbody>
</table>
Slater & Hassey: Ozophora atropicta

Senior author and several colleagues have concentrated upon collecting specimens of Ozophora on several trips to Jamaica and have maintained a light trap there for an extended period. Its absence from the Lesser Antilles is less well established but here again the senior author and colleagues have collected on many of the islands where species of Ozophora are abundant without taking a single specimen, nor has one appeared in any collection examined. If atropicta is a species with high dispersal potential its absence from all of these islands seems extremely difficult to explain.

The vicariance hypothesis takes into account the position of Jamaica south of the Cayman trench, and thus the likelihood that the island has never had a land connection with Cuba and Hispaniola. Also, Jamaica appears to have been completely submerged in the Miocene, whereas western Cuba and probably parts of Hispaniola were above water. This suggests the plausibility of an hypothesis that ancestral atropicta populations were present in the Greater Antilles at the time the latter were part of the Mainland and were isolated on Hispaniola. Differentiation took place subsequent to the formation of a water barrier between Hispaniola and Cuba. This vicariance hypothesis seems the most reasonable and parsimonious hypothesis to us. We do believe that insects disperse across water barriers and suggest that atropicta has reached the Bahamas in just that way.

We have discussed the alternate possibilities above in some detail so that it may serve as a basis for future comparisons with the distribution of other West Indian species of Ozophora and to emphasize the possibility that the hitherto dominant idea that the West Indian insect fauna has been the result of dispersal may only in part be true.

Ozophora atropicta (Fig. 1) may be readily recognized by the pale yellow or white calloused margins on the anterior pronotal lobe and anterior collar that contrast strongly with the dark red brown or chocolate brown of the dorsal surface of the anterior lobe and by the presence (always) of a pair of conspicuous white or pale yellow diagonal streaks on the scutellum that contrast strongly with the darker coloration. In some specimens the dark posterior pronotal rays so characteristic of many species of Ozophora are completely developed. The head is broad and relatively short with large eyes. The 1st and 2nd antennal segments are usually entirely pale yellow, the third segment chocolate brown distally (sometimes as much as the entire distal half), the 4th segment has the usual conspicuous white annulus. The parameres and sperm reservoir are distinctive (Fig. 2, 4).

The only species that atropicta is likely to be confused with is parapicta n.e.p. described below from the mainland of South and Central America.

Despite the widespread distribution and apparent abundance in some areas the only information concerning the biology of atropicta appears to be P. D. Ashlock's collection of a single adult under a species of Ficus on Barro Colorado I. in a population of adults and nymphs of O. parapicta and O. conawa. Most of the specimens listed below were taken at light.


VENEZUELA: 1 ♀ Barinus-Reserve Forestal Tocophoro 280 m. 26-29-II-1968 (F. Fernandez & E. Osuna). TRINIDAD: 1 ♀, 1 ♀ St. Augustine 14-VI-1973 (Daranski, O'Rourke, Picchi, Slalter). 40 ♀, 70 ♀ Simla, Arima-Blanchisseuse Rd. 600 ft. 20-VII-1975 (J. Price); 1 ♀ same 12-VII-1975; 1 ♀, 4 ♀ same 14-VII-1975; 1 ♀ same 11-VII-1975; 1 ♀ same 1-VIII-1975. 1 ♀ Simla,
Slater & Hassey: Ozophora atropicta


Ozophora parapicta Slater and Hassey, New Species

(Fig. 3, 5)

Similar in form and color to O. atropicta but more slender. Head and anterior pronotal lobe red brown, lateral pronotal margins and anterior collar a strongly contrasting pale yellow. Posterior pronotal lobe yellow with weakly developed darker rays including meson. Scutellum dark red brown, apex white: smooth calloused divergent elevated areas slightly lighter red brown than ground color but never a strongly contrasting white or pale yellow. Hemeleytra chiefly testaceous with conventionally darker corial areas. Pale spot at inner angle of corium large and elliptical. Membrane fumose with pale veins and apex. Pleural and ventral surfaces reddish brown, paler on abdomen. Legs uniformly pale yellow. Antennal segments I, II and proximal one-third to one-fourth of III testaceous; distal portion of segment III chocolate brown; segment IV with a broad basal white annulus, distal half dark chocolate brown. Dorsal surface pruinose but lacking conspicuous upstanding hairs.

Head relatively short and broad, non-declivent, head length 0.90, width 0.98, interocular space 0.40. Pronotum with complete but shallow transverse impression, calli surface with numerous punctures, posterior pronotal margin concave, pronotal length 1.10, width 1.58. Scutellum slightly excavated near center, scutellar length 1.02, width 0.90. Hemeleytra with lateral corial margins conventionally concave, claval commissure length 0.75, apex clavus-apex corium distance 1.30, apex corium-apex membrane distance 0.96. Metathoracic scent gland auricle straight, rather elongate not curving posteriorly. Forefemora slender with 4 or 5 small sharp ventral spines. Labium exceeding mesocoxae, labial segments I 0.88, II 0.85, III 0.60, IV 0.38 long respectively. Antennae elongate, conventionally terete, antennal segments I 0.65, II 1.92, III 1.58, IV 1.58 long respectively. Total length 5.90.

Paramere with shaft broad tapering to an acute blade, inner projection elongate tooth-like, rather strongly hooked; inner “tooth” extremely broad and short, range-like (Fig. 4). Sperm reservoir with cup nearly circular, wings short, thick and broad (Fig. 5). Vesica with 5 coils.


2All measurements are in millimeters.
(Jas Zetek) No. 4647 Lot no. 40-8104, 1 ♀ 3 ♀ same IV.1941 (at light)
(Jas Zetek) No. 4776 Lot no. 41-7231, 1 ♂ same 7.VIII.1967 (L. & C. W.
O’Brien), 2 ♀ same 7.VIII.1967 (at light) (C. W. & L. O’Brien), 1 ♂ 1 ♀
same 21.V.1962 (H. Ruckes) 7 ♂ 1 ♀ same 18.V-1973 (Under Ficus)
(P. D. Ashlock), 1 ♀ same 20.VII.1962. GUATEMALA: 1 ♀ Chiquimula XI.
1930 (J. J. White) J. C. Lutz collection 1961, 1 ♀ Guatemala City (el. 5000
Univ. Central. TRINIDAD: 6 ♂ 3 ♀ Simla Arima-Blanchisseuse Rd. 20.VII.
1975 (el. 600 ft.) (Blacklight trap) (J. Price), 1 ♀ St. Augustine 14.VI.1973
(light trap) (R. Baranowski, F. O’Rourke, V. Picchi, J. Slater), 1 ♀ Curepe
14-VII-1975 (light trap) (F. D. Bennett). In P. D. Ashlock, J. A. Slater,
American Museum of Natural History, National Museum of Natural History,
R. M. Baranowski and Venezuala University Central collections.

This species is similar in general appearance to O. atropicta. The chief
distinguishing features externally are the lack in parapicta of diagonal white
markings on the scutellum, a more extensively darkened (distal two-thirds)
3rd antennal segment and the dull pruinose dorsal body surface. In atropicta
the dorsal surface of the body is shining to subshining. This pruinosity dif-
ference between parapicta and atropicta is subtle over most of the body un-
less both species are available for direct comparison. The presence of
pruinosity in parapicta can be seen most easily on the anterior pronotal lobe
before, between, and immediately behind the calli. There are striking differ-
ences in the genitalia between the 2 species. The parameres, sperm reservoir
(see Fig. 2, 3, 4, 5) and number of coils of the vesica are quite different in
the 2 species. (Atropicta has 10 vesical coils in addition to the paramere and
reservoir differentiation). The degree of dark coloration on the 3rd antennal
segment is somewhat variable and while usually there is a considerably
greater portion darkened in parapicta than in atropicta the character is not
definitive. Insofar as we have been able to determine the differences in the
scutellar markings are definitive and provide a ready means of separating
the 2 species.

Biology: P. D. Ashlock (U. Kansas) took a series of adults and nymphs in
seed litter below a species of Ficus on Barro Colorado I. in the Canal Zone
(Panama). These specimens were taken together with a series of nymphs
and adults of Osophora concava Distant and a single adult of O. atropicta.
Fifth Instar Nymph: Nymphs of this species and those of Osophora con-
cava were taken together on Barro Colorado Island (Canal Zone) Panama by
P. D. Ashlock on 18-V-1973. Both species show a variegated striped dark and
pale pattern similar to that described for Osophora hirsuta by Slater and
Baranowski (1970). The 2 species are easily separable. Parapicta has a
glabrous dorsal surface, the dark longitudinal head stripes on either side of
the midline are continuous with the dark tylus and do not expand laterally
before the epicranial arms, the dark thoracic stripes lateral of the midline
are separated completely by a pale stripe from the still more lateral dark
areas, the lateral margin of the explanate margin is pale, the apical portion
of the mesothoracic wing pad, while dark, has a narrow pale vitta (some-
times reduced to a small spot), the dark sclerites around the dorsal abdome
nal scent glands are short and subquadract and the labium extends to or
slightly beyond the posterior margin of the metacoxae.
Ozophora concava agrees with hirsuta and differs from parapieta in having numerous conspicuous hairs on the dorsal surface, the dark longitudinal head vittae not reaching the dark coloration of the tylus but expanding laterally along the epicranial arms, having the dark coloration of the pronotum confluent between the inner and outer striping so that the pale markings appear as separated spots and streaks rather than as distinct complete stripes, in having completely dark distal portions of the mesothoracic wing pads, noticeably wider, more slender and elliptical sclerites about the dorsal abdominal scent gland openings and with the labium usually only attaining or extending slightly between the metacoxae.

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Literature Cited


