



The Methiini of the West Indies with notes on circum-Caribbean Methia (Coleoptera : Cerambycidae)
by Thomas Keith Philips

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in
Entomology

Montana State University

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Abstract:

The tribe Methiini is revised for the West Indies. *Cyanomethia belli* (NEW GENUS, NEW SPECIES) is described from St. John, U. S. Virgin Islands. *Methia jamaicensis* (NEW SPECIES) Jamaica, and *M. caymanensis* (NEW SPECIES) Cayman Islands, are described. *Methia punctata* LeConte, *M. constricticollis* Schaeffer, *M. pallida* Fisher, *M. pulchra* Chemsak and Linsley, *M. insularum* Chemsak, *M. impressicollis* Chemsak, *M. taina* Zayas, *M. rhizophorae* Chemsak and Feller, and *Tessaropa luctuosa* Zayas are synonymized with *Methia necvdalea* (Fabricius) (NEW SYNONYMIES). A phylogenetic hypothesis is proposed for *Styloxus*, *Coleomethia*, *Tessaropa*, *Cyanomethia* and the species of *Methia* found in the Caribbean region. Morphological variation and zoogeography of West Indian *Methia* are discussed and keys given for the genera and species of Methiini found in the West Indies and circum-Caribbean region.

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MONTANA STATE UNIVERSITY
Bozeman, Montana

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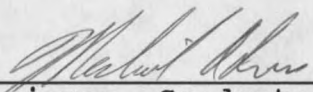
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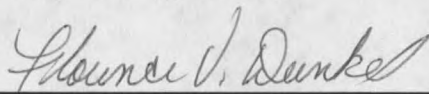
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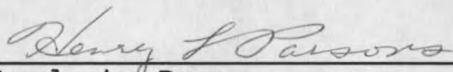
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ABSTRACT

The tribe Methiini is revised for the West Indies. Cyanomethia belli (NEW GENUS, NEW SPECIES) is described from St. John, U. S. Virgin Islands. Methia jamaicensis (NEW SPECIES) Jamaica, and M. caymanensis (NEW SPECIES) Cayman Islands, are described. Methia punctata LeConte, M. constricticollis Schaeffer, M. pallida Fisher, M. pulchra Chemsak and Linsley, M. insularum Chemsak, M. impressicollis Chemsak, M. taina Zayas, M. rhizophorae Chemsak and Feller, and Tessaropa luctuosa Zayas are synonymized with Methia necydalea (Fabricius) (NEW SYNONYMIES). A phylogenetic hypothesis is proposed for Styloxus, Coleomethia, Tessaropa, Cyanomethia and the species of Methia found in the Caribbean region. Morphological variation and zoogeography of West Indian Methia are discussed and keys given for the genera and species of Methiini found in the West Indies and circum-Caribbean region.

CHAPTER 1

INTRODUCTION

The tribe Methiini within the subfamily Cerambycinae has been subject to a great deal of taxonomic confusion, since the first species was described and placed incorrectly in what is now the Lamiinae (Fabricius, 1798). The subfamilial placement and tribal limits of included taxa have been stabilized following a variety of recent views (Cazier and Lacey, 1952; Linsley, 1962; Martins et al. 1966; Chemsak and Linsley, 1967). The species have been revised for America north of Mexico (Linsley, 1962), Mexico and Central America (Chemsak and Linsley, 1964), Curaçao, Bonaire, and Aruba (Gilmour, 1968) and various island groups of the West Indies (Cazier and Lacey, 1952; de Zayas, 1975; Villiers, 1980). These treatments varied in their depth and in the species concept used. In this study, I revise the species of Methiini in the West Indies, and the species of Methia occupying lowlands around the Caribbean Sea and the Gulf of Mexico.

Eleven species of Methia and one species of Tessaropa have been described from the West Indies and circum-

Caribbean region. The problems described below regarding the species-level classification of Methia have resulted from species which are extremely variable, both intraspecifically and intersexually in characters such as color, degree of dorsal and ventral eye separation, and elytral shape and sculpture. Species delimitations based on these highly variable characters, compounded by the problems associated with small type series and possible assumed endemism, have contributed to the current state of taxonomic confusion.

This revision defines species limits for Methia and discusses the distributional patterns in the circum-Caribbean region, a necessary base for all future bionomic studies. The hypothesized phylogeny between Methia species and its closely related genera additionally provide the framework for future studies on the relationships between all the genera and species within the Methiini.

CHAPTER 2

MATERIALS

This study is based upon an examination of approximately 1,500 adult specimens of Methia and about 50 specimens of other closely related genera. Of these, 440 are from the West Indies sensu stricto. It should be noted that although this project has brought together nearly all available specimens from the West Indies, there is a very strong geographic collecting bias. Over 1/3 of the specimens examined (154) are from the Virgin Islands. There were less than 15 specimens each from Cuba, the Cayman Islands, and the islands of the Lesser Antilles. However, because the variability exhibited in the larger series overlapped that of the small series, the material was sufficient to make a good estimate of species limits based on consistent morphological characters.

The following institutions and individuals loaned material for this study, identified in the text with the accompanying acronyms.

- BPBM - Bishop Museum, Honolulu (S. Miller);
- BMNH - British Museum (Natural History), London (R. Pope
& J. Marshall);
- CASC - California Academy of Sciences, San Francisco (D.
H. Kavanaugh);
- CJSC - J. Cope, private collection, San José;
- CNCI - Canadian National Insect Collection, Ottawa (J.
McNamara);
- DHCT - D. Heffern, private collection, Houston;
- DMAG - Museum and Art Gallery, Doncaster (P. Skidmore);
- EJGC - E. J. Gerberg, private collection, Baltimore;
- FSCA - Florida State Collection of Arthropods, Gainesville
(M. Thomas & B. Beck);
- FTHC - F. T. Hovore, private collection, Newhall;
- IJSM - Natural History Museum, Institute of Jamaica,
Kingston (T. H. Farr);
- IREC - Institut de Recherches Entomologique de la Caraïbe,
Guadeloupe (F. Chalumeau);
- JMIC - J. Micheli, private collection, Ponce;
- MAIC - M. A. Ivie, private collection, Bozeman;
- MHND - Museo Nacional de Historia Natural, Santo Domingo
(L. Dominguez & R. Rimoli);
- NMCE - National Museum of Natural Sciences, Ottawa (B.
Gill);

- NMNH - National Museum of Natural History, Washington
(T. J. Spilman);
- OSUC - The Ohio State University Collection of Insects and
Spiders, Columbus (C. A. Triplehorn);
- RHTC - R. H. Turnbow, private collection, Fort Rucker;
- RSMC - R. S. Miller, private collection, Columbus;
- TAMU - Texas A&M University, College Station (E. G. Riley)
- TMPC - T. McCabe, private collection, Albany;
- UCBC - California Insect Survey, University of California,
Berkeley (J. A. Chemsak);
- UCDC - Bohart Museum, University of California, Davis (R.
O. Schuster);
- UPRR - University of Puerto Rico Agricultural Experiment
Station, Rio Piedras (R. Inglés);
- UVCC - University of Vermont Collection, Burlington (R.
Bell);
- VIER - Virgin Islands Ecological Research Station, Virgin
Islands National Park, St. John (J. Miller);
- WHTC - W. H. Tyson, private collection, Fresno;
- ZMUC - Zoological Museum, University of Copenhagen,
Copenhagen (O. Lomholdt & O. Martin);

Material deposited in my private collection is
indicated TKPC.

CHAPTER 3

METHODS

Species limits were determined by morphological analysis using the criteria of Whitehead (1972). Species are populations or groups of populations which are reproductively isolated from all other populations even if gene flow potentially exists. But because we have no information on gene flow, we have to use a practical species definition based upon the available data from adult morphology and distribution.

Initially, all available specimens from each Caribbean island were examined and sorted into groups based on their external similarity. Internal characters were then examined for consistency within and between these groups. Populations from different islands were then compared, and lastly comparisons were made with species and specimens present on adjacent areas of North and South America. Due to the large amount of sexual dimorphism, males were first critically examined and the resulting hypotheses about species limits tested with females. Types were examined by myself or M. A. Ivie for

all species except M. punctata LeConte, M. constricticollis Schaeffer, M. taina Zayas and Tessaropa luctuosa Zayas. An attempt to borrow the LeConte and Schaeffer types is in progress. The Zayas types are in Havana, and presently unavailable.

Dissections were made to analyze and compare mouthparts, wings, and genitalia. Before dissecting, specimens were soaked in hot distilled water (90-99 ° C.) to soften tissues. Gross structures were then carefully cut out using minuten pins. Cuticular structures were cleared in lactic acid or a weak solution of sodium hydroxide. Lactic acid was the preferred clearing agent because of its slower and more gentle action. Parts were then neutralized, rinsed with distilled water, and stored in glycerin. Structures were studied on temporary slide mounts in glycerine. Illustrations were made using drawing tubes on Wild M20 compound and Wild M5 dissecting microscopes. Measurements were made at 50X, using a micrometer eyepiece with a scale interval of 0.1 mm. Dissected structures were placed in genitalia vials or glued to a card, and placed on the specimen pin after examination. Wing venation was homologized with Ponomarenko (1973) and Doyen (1966). Genitalic structures were homologized with Sharp and Muir (1912) for males and Tanner (1925) for females.

Cladistic analyses were used to interpret relationships among genera closely related to Methia, and among Methia species included in this study. Cladistic principles modified from Hennig (1966), as presented by Wiley (1981) were used. All relationships are hypothesized on the basis of synapomorphies (i.e. shared derived characters). Out-group comparison was used for polarization of characters using the methods outlined in Watrous and Wheeler (1981) and modified by Madison et. al. (1984). The analysis was performed by hand and Cladose (version 0.9 Beta Test by K. C. Nixon, Cornell University) was used to print the cladogram (fig. 45). Label data was recorded using the conventions of von Hayek (1973).

CHAPTER 4

TRIBE METHIINI THOMPSON

Methiini Thompson, 1860: 128,364. Martins et.al., 1966:
197. Chemsak and Linsley, 1967: 28. Gilmour, 1968:
88. Villiers, 1980: 266.
Oemini: Linsley, 1961b: 629 (part).

For more complete synonymy, see Linsley (1962: 13).

Species now placed in the Methiini were described in what is now the Lamiinae by Fabricius (1798), a view followed by Thomson (1860) when he erected the Methiini. Gahan (1904) was the first to place the Methiini in the Cerambycinae. The separation of the Methiini and Oemini, although recognized as inaccurate by earlier workers (Gahan 1904, 1908; Aurivillius, 1912; Craighead, 1923), was formally corrected by Linsley (1962) who synonymized the tribes. The genera of Western Hemisphere Methiini were revised by Martins et. al. (1966) and Chemsak and Linsley (1967).

Three genera of methiines are here recognized from the West Indies, Methia Newman, Malacopterus Audinet-Serville, and Cyanomethia NEW GENUS. Methia is a

relatively large genus with 45 currently recognized species, reduced by nine (to 36), in this study. All are small, delicate beetles with most species ranging from 4 - 9 mm in length, but some, such as M. mormona Linell, reach a length of 15 mm. Found only in the new world, the genus is distributed from Argentina north through Central America to southern Idaho and Virginia. In addition to the 12 previously recognized species recorded from the West Indies and circum-Caribbean region, four are described from South America with the remainder from the southern USA and Mexico.

Malacopterus tenellus (Fabricius) has been recorded from Guadeloupe in the Lesser Antilles (Villiers, 1980).

Cyanomethia is presently a monotypic genus, known only from St. John, U.S. Virgin Islands by a purported lycid-mimicking species.

Tessaropa, reported from the West Indies by Zayas (1975) and Chemsak and Linsley (1982), is here removed from the West Indian fauna, and the species involved moved to Methia.

Key to the Genera of West Indian METHIINI

1. Procoxae separated by prosternal process, length greater than 17 mm.....Malacopterus
- 1'. Procoxae contiguous, length less than 15mm.....2

2. Eye facet size small (about 0.02 mm diameter), second antennal segment transverse (about 2.8 times as wide as long), metatarsal first segment short (length less than twice the width), head as in figures 1.....
Cyanomethia
- 2'. Eye facet size large (about 0.04 mm diameter), second antennal segment elongate (less than two times as wide as long), metatarsal first segment long (length greater than twice the width), head as in figure 2...
Methia

Cyanomethia New Genus

Diagnosis. Females of this genus have a large abdominal apex opening. Other genera with similar abdominal modifications in females can be separated from Cyanomethia as follows: from Methia by the characters in the key (excluding the eye facet size which does not work for all mainland species); from Coleomethia and Tessaropa by the heavily rugose elytra and pleisiomorphic wing venation (four anal veins instead of three).

Description. Male. Form small, robust. Integument shining, covered with fine erect or suberect setae. Front of head vertical, deeply impressed on vertex between antennal insertions; labrum broadly rounded, clypeus rounded, frons broadly, shallowly, sharply emarginate medially at anterior margin; mandibles stout, moderately blunt; palpi short, slightly pointed, apices rounded; labium reduced; eyes finely faceted, facets approx. 0.02 mm in diameter, upper and lower eye lobes separate but joined by a line, lower lobe approx. four times the size of upper lobe; eyes separated on dorsal surface by slightly greater than maximum width of antennal scape, on ventral surface by length of the scape and second antennal segment. Antennae 11-segmented, extending 5 segments beyond abdominal apex, ratio of antennomere lengths (2-11) 0.4:8.2:9.0:9.7:9.0:8.7:8.2:7.8:8.5:7.4; scape stout, subcylindrical, narrowed at base, outside edge slightly projecting at apex, length including basal joint slightly greater than $1/2$ the length of the third segment, width 2X width of third segment; second segment very short, transverse, length to width ratio 11:4. Pronotum as long as broad, sides slightly expanding from apex to basal $1/3$, then narrowing to basal constriction near margin; basal constriction as narrow as apex; impressed transversely at anterior and basal $1/5$; transversely inflated at basal

margin, interrupted at middle, basal margin finely transversely plicate in anterior half; disc slightly inflated, laterally smooth with a few scattered punctures, other areas coarsely rugose-punctate. Scutellum as long as broad, chordate shaped, anterior margin rounded. Prosternal process not visible, procoxae contiguous, procoxal cavities acutely angled laterally; mesosternal process not visible, mesocoxae contiguous. Elytra ca. 25% longer than basal width, broadly rounded at apex, declivous at apical $1/5$; each elytron with three distinct costae, which branch irregularly at apical $1/3$; increasingly rugose towards apex. Femora and tibia finely, transversely plicate; femora stout, broad, concave on inner surface, sparsely, irregularly punctate, more densely so towards apex, profemora widest at middle, mesofemora and metafemora widest at apical $1/3$; tibia slender, moderately pilose, metatibiae longest, about twice the length of the metatarsi; tarsi short, subcylindrical; metatarsal first segment slightly shorter than second and third segments together, first segment about 50% longer than wide, protarsal first segment $2/3$ length of second and third segments together. Abdomen with six visible sternites, fifth broadly emarginate.

Type species- Cyanomethia belli Philips and Ivie.

Etymology. This genus is named from the greek word cyano as a modifier of Methia, after its distinctive coloration of metallic bluish- or purplish-black.

Cyanomethia belli New Species

Diagnosis. This is the most distinctive methiine in the West Indies. Its lycid-like coloration of bluish- or purplish-black, with the basal $3/5$ of the elytra testaceous-orange and its distinctly rugose, abbreviated elytra, will differentiate this species.

Description. Male. Form small, robust. Integument shining dark brown to black, with blue or purple reflections. Elytra testaceous orange with apical $2/5$ dark purplish black. Antennal scape black, all other segments brown. Prothoracic legs brown to orange brown, meso- and metathoracic legs brown to dark brown. Body clothed with light depressed or subdepressed setae, except on antennae, tibiae, and tarsi. Head slightly wider than pronotum, front slightly convex, dark brown to black with blue reflection, notched between antennal insertions, slightly impressed on vertex between eyes, front and vertex densely, coarsely, irregularly punctate-rugose, laterally with sparse, moderate punctures and somewhat coarsely plicate; posterior and ventral margin of eyes and

posterior margin of mouth densely, finely, irregularly punctate. Antennal scape moderately, irregularly punctate, second segment very short, close to 3X as wide as long, all other segments elongate slender; all segments clothed with moderately dense, black setae, erect on outer surface, suberect to depressed on inner surface. Pronotum as long as broad, sides slightly expanding to approximately basal $1/3$; base slightly constricted before margin, to as narrow as pronotal apex; disc moderately densely, coarsely, irregularly punctate at midline, laterally with irregularly shaped glabrous areas; impressed transversely at anterior and basal $1/5$; basal margin inflated, interrupted medially, with fine transverse plications mainly in anterior half; sides densely, coarsely irregularly punctate, plicate near posterior margin. Stridulatory plate of mesonotum smooth without a line, scutellum rugose. Prosternum moderately rugose-punctate, mesosternum more finely rugose-punctate, metasternum with fine scattered punctures. Elytra extending to second visible abdominal segment, broadly rounded at apex; each elytron with three distinct costae, branching in apical $1/3$, rugosity increasing towards apex. Abdomen rugulose with fine punctures, sixth visible sternite shallowly, obtusely emarginate apically. Femora and tibiae finely, transversely plicate, setae dark brown to brown on dorsal surface of protibiae and mesotibiae,

throughout on metatibiae. Genitalia as in figure 29.

Length: 7.7 mm.

Female. Unknown.

Distribution. The unique holotype is from the island of St. John, U.S. Virgin Islands.

Holotype (male) labelled: Caneel Bay, Lind Pt.; St. John, Virgin I.; Jan.11,1966; Coll. R.T.Bell (UVCV, deposited by permission of R. Bell in the NMNH).

Etymology. This species is named after Ross Bell, who collected the only specimen known.

Discussion. The color pattern and form of Cyanomethia belli indicates that it is probably a mimic of a Lycidae. Hypotheses of lycid mimicry among cerambycids is usually indicated by a number of features developed to various degrees such as a flattening of the body, reduction in antennae length, serration of the antennae or the appearance of serration with setae, aposomatic coloration, a slight flaring of the elytra, and elytral ridges and reticulations (Linsley, 1961b). Cyanomethia has the latter three characteristics to suggest this type of mimicry. Purported Methiine mimics of lycids are not unknown and include at least two species of Methia (Chemsak and Linsley, 1971).

If Cyanomethia is a lycid mimic, what is its model? There are two genera of lycids known from the islands of the Puerto Rican Bank, Thonalmus and Leptolycus (Leng &

Mutchler, 1922). Leptolycus is much smaller in both length and width and would not present a good model. Thonalmus is about the same length as Cyanomethia, but appears much larger due to its broad and apically expanded elytra. Cyanomethia is yellow on the basal 3/5 of the elytra, with the rest of its body dark metallic, including the abdomen, which extends well past the elytral apices. The overall appearance is somewhat like the orange-yellow and metallic blue Thonalmus, but this genus is purported to be introduced to the Puerto Rican Bank (Leng and Mutchler, 1922), and is not yet known from St. John (M. Ivie pers. com.).

One other possibility is that this record is the result of an introduction, with the mimicry pattern having evolved elsewhere. This has been the case for the lygaeid, Heraeus trigutatus (Guerin), a black and orange insect which is part of a mimicry complex in Cuba (Slater, 1988). Heraeus trigutatus is the only species of this ring which occurs outside of Cuba, and is common in extreme southern Florida, without its model.

Methia Newman

Thia Newman, 1840: 18.

Methia Newman, 1842: 418. LeConte, 1852: 144; 1873: 348.

Thomson, 1860: 128; 1864: 387. Lacordaire, 1872: 466.

LeConte & Horn, 1883: 334. Leng and Hamilton, 1896:

162. Aurivillius, 1912: 38. Meltzer, 1923: 529.

Linsley, 1932: 120; 1940: 36; 1962: 25. Zajciw, 1957:

305. Chemsak and Linsley, 1964: 52; 1967: 30. Martins

et. al., 1966: 205. Gilmour, 1968: 92. Zayas, 1975:

52. Villiers, 1980: 268.

Diagnosis. Methia can be distinguished from all other genera by the following combination of characters: antennae 11-segmented, second segment small but distinct; antennae lacking a projecting cicatrix on scape and segments without spines; basal segments of antennae beyond scape not thickened, more slender than scape; palpi normal, not atrophied; pronotum as wide as or wider than long; elytra usually abbreviated, not extending past the abdominal apex; elytra gradually narrowing apically (except M. Lycoides), suture not arcuate; abdomen at least as long as metathorax.

Methia is also characterized by antennae longer than the body in both sexes, short palpi, and eyes that are large and deeply emarginate. In some species or

specimens, the upper and lower eye lobes are completely separated without connecting facets. This genus is further characterized by a variable prosternal process (fig. 3), which is reduced relative to most other genera in the Methiini (Linsley, 1962). The prosternal process ranges from being absent in some species, to arising beneath the posterior margin of the prosternum in others (Martins et. al., 1966). In those species that have a process, it is hidden by the confluent procoxae, except at its apex.

One last characteristic, found only in females, is a modified abdominal apex. The apical opening is large, about the same diameter as the preceding segments, and fringed with both tapered and clavate setae (fig. 24).

Description. See Linsley (1962:26).

Discussion. Most, but not all species of Methia are rare in collections, and little is known of their habits. Larvae of some species are known to be dead-twig borers (Linsley, 1962; Turnbow and Hovore, 1979; Hovore et.al., 1987). Most species of Cerambycidae which feed on dead wood as larvae generally have a fairly broad host range (Linsley, 1961a). Many diverse hosts are known for Methia species found in the United States. These include Quercus for M. aestiva Fall, Prosopis for M. arizonica Schaeffer, and Juniperus for M. juniperi Linsley (Linsley, 1962),

which was recorded feeding in twigs, girdled by Styloxus bicolor Champion and Knull (Linsley, 1936). Methia brevis Fall has also been reared from Psorothamnus fremontii (J. Cope, pers. comm.). The broad host range within a species is demonstrated by Methia necydalea, with known hosts of Taxodium (Craighead, 1923) and Quercus (Turnbow & Hovore, 1979).

Species of West Indian Methia are active throughout the year. Specimens have been collected on Jamaica every month, except for April and May. Virgin Islands material includes specimens collected during every month, with collecting peaks during March through April and July through August.

With the exception of two Methia species described from Mexico, M. lycoides Chemsak and Linsley and M. batesi Chemsak and Linsley, all known species of this genus are nocturnal. The two diurnal species are apparently mimics of lycids (Chemsak and Linsley, 1971). The nocturnal habits of the majority of species has contributed to a lack of knowledge on this genus. Most specimens examined, with the capturing mode recorded, have been collected at light. Collection of Methia adults is also possible by beating branches (M. Ivie, pers. com.). Adults are very active and may be overlooked at lights by being confused with winged ants. Whether this is a case of behavioral

mimicry or is an artifact of the artificial situation at a blacklight sheet is unknown.

Females of all Methia, and the closely related Coleomethia and Tessaropa, are characterized by modification of the abdominal apex. The modification includes an apical opening as wide as the preceding abdominal segment, the fifth sternite deeply and sharply angularly emarginate and fringed with variously modified setae (fig. 24). This same apical modification consisting of the presence of curved, clavate setae fringing the wide abdominal opening is present in some members of several cerambycine tribes; the Purpuricenini, Pteroplatini, Trachyderini, Torneutini, Platyarthrini and the Hesperophanini (Chemsak and Powell 1966). Similar modification is also present in some elaterids and apatine bostrichids. The development of these setae in phylogenetically widely separated families and tribes is obviously a case of convergence. All of these groups have in common larvae feeding in wood and females ovipositing directly onto the host material.

Oviposition and the function of the setal fringe has been reported only in Tragidion armatum LeConte, a purpuricinine Cerambycidae (Chemsak and Powell, 1966). Females of this species search for oviposition sites by arching the abdomen ventrally so that the setae are in contact with the substrate and then drag them along the

substrate as they walk. The movement of the abdominal apex over the substrate causes a large amount of debris to be brushed up and trapped within a pouch-like concavity between the setal fringe and the ovipositor. When a suitable location has been found, the female oviposits on the surface of the larval host. When an egg is deposited, a glutinous secretion is released which binds the collected debris over the egg surface. Eggs laid in this manner were completely covered by a mound of fine particles.

Methia most likely use their modified female abdominal apex in a similar manner. This is implied by numerous specimens examined which had the area anterior to the setal fringe filled with detritus.

The clavate setae lining the abdominal apex in the Purpuriciniini differs from those within the Methiini in that they arise from the at least partially hidden sixth sternite instead of the fifth. Purpuricines also never have the fifth sternite more than shallowly emarginate, compared to the deeply notched sternite in Methia and related groups. The clavate setae of purpuriciniines also have relatively long stalks and are on the posterior edge of the sixth sternite, which is hidden up inside the fifth sternite. The long stalks may be necessary if the clavate

heads are to make contact with the substrate during oviposition.

The number of eggs Methia females produce would be difficult to determine without controlled laboratory studies. In cerambycids (mainly within relatively large species of Prioninae), estimates of fecundity have usually been determined by dissections of captured females. Laurent (1905) found an average of 385 eggs carried by 10 females of Prionus laticollis (Drury). A female of P. californicus Motschulsky was found to contain 1200 eggs (Hardy and Preece, 1927). Dissections of two females of Methia necydalea, whose abdomens appeared to be filled to capacity with mature eggs, were found to contain 127 and 118 ova. The eggs are chestnut brown to pale yellowish brown in color, ovoid in shape, and are approximately 0.9 mm long and 0.5 mm wide.

Most Methia are polymorphic due to intraspecific and intersexual variation. This polymorphism includes color, body robustness, antennal length, elytral length, and dorsal and ventral eye separation. Females can be separated from males by their five visible sternites (six in males) and by the modified apical end of their abdomens. Additionally, females are paler, more robust, have relatively shorter antennae and longer elytra, and have the eyes more widely separated dorsally and ventrally

than males. It should be noted that except for the abdominal differences, these are general trends which often show a great deal of overlap, and should be used with a great deal of caution. The degree to which specific characters are sexually dimorphic varies among species. For example, elytral length is relatively longer in females of some southwestern USA and Mexican species, but not in others. Sometimes elytral length can be used to distinguish males and females within a particular series, but this begins to break down when other series are included. Females in some species are often slightly paler than males and can be extremely different as seen in a reared series of M. brevis Fall from Inyo County, California, where all males are dark brown and all females are testaceous (CJSC). In summary, most of these characteristics, because of their variability and overlap between the sexes, should only be used broadly, if at all.

The width of the facet connection between the upper and lower eye lobes has traditionally been used by workers in this group to differentiate species, but was found to have too much variability to be useful here. For example, many specimens of M. necydalea were found to have dorsal and ventral eye lobes unconnected or joined by as many as two rows of facets within a series (fig. 4). Additionally, eye separation on the dorsal and ventral surfaces is extremely variable (figs. 5, 6).

One last character used is the degree of basal pronotal constriction. Unfortunately, strongly constricted pronota can be found throughout the West Indies and circum-Caribbean region (fig. 7).

Relatively few characters are consistent enough to differentiate species. Fortunately, the shape of the lobes of the prementum and postmentum of the labium are very diagnostic in the West Indian species. The postmentum cannot be seen without dissection, but the prementum can sometimes be seen under high magnification. From preliminary investigations, the labial shape also appears to be useful in separating other species of Methia. The shape of the labial palps was fairly consistent in all West Indian Methia species and therefore not taxonomically used here.

Male genitalia of Cerambycidae are generally thought to be homogeneous and unnecessary for species determinations (Linsley, 1961a). More recent workers such as Ivie (1985) and Galileo (1987) have found them to be useful. Genitalic variation in Methia is not dramatic, but consistent species-level characters can be found in the male genitalia. These differences lie in the shape of the apical cleft of the parameres. This character also has the advantage of its visibility without the need for

dissection, although relaxing the specimen is sometimes necessary.

Many characters which were initially thought to be promising in differentiating species later proved to be useless. Two such characters were the presence or absence of a tooth on the prosternal process, and the shape of process' apex. A tooth on the ventral edge of the process may be present or absent within any of the West Indian species, and the size, shape, and position of the tooth varied a great deal. The shape of the apex of the process was also found to vary from truncate to rounded.

The shape of the maxillary palps also initially appeared promising, but is extremely variable in all three recognized West Indian species. The variability in shape of the apical segment is especially pronounced, ranging from stout and blunt to elongate and pointed (fig. 8).

The median lobe was not found to be useful for diagnosis of Methia species, being too variable in form (fig. 19). It is, however, useful for generic characterization.

Wing venation is also useful for generic characterization, but was not useful in differentiating Methia species in this study. There was some variability in the length of the medial vein and the degree of pigmentation, especially at the apex, but no consistent

differences were found between the three recognized species.

Other characters examined include: 1) setal shape and setal position on female apical sternites, female genitalia, antennae, mouthparts, and other external parts of the body, 2) the shape of various structures such as the mandibles, clypeus, labrum, eye lobes, and 3) relative lengths of the tarsomeres and antennomeres. These were all found to be useless for differentiating species.

To summarize, previous workers in the group have indicated that color, and external shape and form are sufficient to describe or correctly determine specimens. Methia is a genus which is so variable in structure that internal structures are the only ones consistent enough to precisely define many species limits. It will therefore be critical to allow dissections to be performed on specimens, if the taxonomy of this group is to be resolved.

Key to Methia of the West Indies and Adjacent Areas

1. Stridulatory plate of mesonotum with a median longitudinal line. Elytral pattern consisting of a dark vitta from the humerus running obliquely inwards to about apical 1/3 or 1/4, usually a more vague, short vitta with a darkened apex subparallel to the first on the anterior part of disc (fig. 9).
Curaçao, Bonaire, and Aruba.....M. trium
- 1'. Stridulatory plate of mesonotum without a median longitudinal line or elytral pattern not as above..2
2. Elytra usually dark reddish brown at humeral angle, medially in longitudinally elongate and sometimes broken patches from basal 1/4 to apical 1/4, between three distinct and sometimes lighter colored costae, and at apex (fig. 10). Other areas usually light brown to brownish yellow. Male parameres with an acute emargination (fig. 14). Jamaica.....
.....M. jamaicensis
- 2'. Elytral pattern not as above and parameres with a rounded emargination or an uncleft apex.....3

3. Male paramere entire (fig. 15), prementum lobes of the labium parallal sided (fig. 22), elytral pattern as in fig. 11. Cayman Islands.....M. caymanensis
- 3'. Male paramere with at least a vestige of cleft present (fig. 16), more normally a cleft which is rounded in the anterior portion (fig. 18). Prementum lobes of the labium variable but triangular shaped (fig. 23). Elytral pattern extremely variable (fig. 12). The West Indies, except Jamaica, Cayman Islands, and Barbados and Belize through southern and eastern Mexico, to Texas and the southeastern USA.....
.....M. necydalea

Methia trium Gilmour

Methia trium Gilmour, 1968: 100. Chemsak and Linsley, 1982: 12.

Diagnosis. Methia trium Gilmour is a very distinctive species, with its characteristic median mesonotal line, and unique elytral pattern consisting of a dark vitta from the humerus running obliquely inwards to about the apical 1/3 or 1/4, usually a more vague, short vitta with a darkened apex subparallel to the first on the anterior part of disc, and a darkened apex (fig. 9).

Male paramere as in figure 13. Female genitalia as in figure 25. Labium and maxillary palp as in figure 20.

Description. See Gilmour (1968).

Distribution. This species is known only from the continental islands of Curaçao, Bonaire, and Aruba.

Material Studied. (all MAIC). CURAÇAO: 1 female--Carmabi, Piscadera; Baai (at light), 16.XII.1963; (P. Wagenaar Hummelinck). 1 male--ibid, 24.X.1963. 1 male--Coral Specht; 3 km. E. Willemstad; 8-15 February 1987; W.E.Steiner & J.M.Swearingen/ Malaise trap in; mesquite-acacia; desert scrub; near coast. 1 male--Coral Specht; 3 km. E. Willemstad; 9 February 1987; W.E.Steiner & J.M.Swearingen/ at black light; mesquite-acacia; desert scrub; near coast. 1 male--ibid, 13 February 1987. 2 females--ibid. 1 female--Ascencion; 12 February 1987; W.E.Steiner & J.M.Swearingen/ At black light; in grove of; Hippomane; mancinella.

Discussion. Gilmour (1968) described this species based on a series of 96 specimens. It is interesting to note that 13 of these specimens were not made part of the type series because the mesonotal stridulatory plate did not have a visible line, although those specimens agree with the type series in all other respects.

Methia jamaicensis New Species

Methia necydalea: (not Fabricius) Leng and Mutchler,
1914:444 (in part). Blackwelder, 1946:559 (in part).

Methyia necydalea Gowdey, 1926:21 [misspelling].

Diagnosis. M. jamaicensis is characterized by a distinct elytral pattern (fig. 10), a short postmentum measured longitudinally (fig. 21) and a paramere cleft that is sharply emarginate in the apical portion (Fig. 14).

Description. Male. Form elongate-slender, slightly tapering. Integument reddish-brown to dark brown. Elytra dark reddish brown at humeral angle, from basal 1/4 to apical 1/4 in longitudinally elongate and sometimes broken vittae, between distinct sometimes lighter colored costae, and at apex (fig. 10); other areas light brown to brownish yellow. Head wider across eyes than pronotum, sometimes inflated on vertex behind eyes; front areolate-rugose, less so on vertex; densely, confluent, irregularly punctate at posterior margin; eye lobes connected by a single row of facets; antennae extending 4-5 segments beyond the body, scape without a distinct tooth; labial postmentum width to length ratio, 3:1; prementum lobes triangular shaped. Pronotum slightly broader than long,

usually slightly narrower at base, sides broadly rounded except subparallel at apical $1/6$ and basal $1/5$; disc moderately finely, densely rugose-punctate, slightly impressed transversely near anterior and posterior margins, two slight irregularly shaped callosities at anterior $1/4$ on each side of midline. Pronotum dark brown to reddish brown except for paler, irregular and sometimes faint longitudinal vittae from anterior callosities to near posterior margin; pale longitudinal maculation medially near posterior margin, usually slightly raised. Stridulatory plate of mesonotum smooth without a line. Prosternum finely rugose-punctate, with sparse, long, erect setae; mesosternum more densely rugose-punctate, with moderately dense, subdepressed setae; metasternum finely, regularly punctate with moderately dense, subdepressed setae. Elytra extending to fourth abdominal segment, narrowly rounded at apex; each elytron moderately distinctly tricostate, except vague at and near apex; punctures moderately coarse at base, becoming finer towards apex, subconfluent; pubescence pale, moderately dense, suberect; each elytron dark reddish brown at humeral angle and at vittae located between second and third costae; vittae expanded transversely at basal $1/4$ and more broadly from middle to apical $1/5$; dark maculation at apical $1/6$ between vague second and third costae, sometimes extending to lateral margin and/or

elytral suture, maculation sometimes paler than vittae; costae often slightly lighter in color than surrounding area. Abdomen moderately, finely punctate with moderately dense setae, fifth sternite broadly emarginate. Femora finely, transversely plicate. Male paramere as in fig. 14. The cleft-depth on the male paramere varies from $1/4$ to $3/4$ of the total length of the paramere main body but is always acute. Labium as in fig. 21. Length: 5.8-7.9 mm.

Female. Differs from the male by the larger average size and the fifth sternite deeply, angularly emarginate. Upper and lower eye lobes are connected by 1-2 facets. Antennae extending 3-5 segments beyond the length of the body. On one female, the elytral vittae and maculations are less distinct. Female genitalia, in an extended position, as in fig. 26. Length: 6.3-10.2 mm.

Distribution. Jamaica.

Material Studied. Holotype (male) labelled: JAMAICA, Try.; Duncans; VIII.15.1966; Howden & Becker (CNCI). Paratypes 19: 4 males--JAMAICA: Try.; Duncans; VIII.22.1966; Howden & Becker (CNCI). 1 female--ibid. VIII.20.1966 (CNCI). 1 female--ibid. VIII.7.1966; H.F.Howden (CNCI). 1 male-- Hill Gardens; JAMAICA; 4.III.1922; No 867/ C.C.Gowdey/ Pres. by; Imp. Bur. Ent.; Brit. Mus.; 1923-233 (BMNH). 1 female--Jamaica; 93-25/

Kingston Jam; J.J.Bowrey (BMNH). 1 female--Jamaica; Black R.; II 22.37/ Sta 413; Chapin and; Blackwelder (NMNH). 1 male--Jamaica W. I.; St. Catherine; Port Henderson; Hill. 11 March 1959; T.H.Farr (DMAG). 1 male--Kingston, Jamaica.; Sept.9 1917 459; Harold Morrison (NMNH). 1 ?-- Jamaica B.W.I.; Clarendon; 1/2 mi.N.of; Corner Shop; June 22 1955; G.R.Proctor (DMAG). 1 female--Jamaica B.W.I.; St. Andrew; Upper Mt. View; 20 MAY 1954; C.B.Lewis (DMAG). 1 female--ibid. MARCH 1955 (IJSM). 1 female--Jamaica IW.; St. Andrew; Red Hills; Road.; 10 June 1973; T.H.Farr; (on reverse side) Sunrise Crescent (IJSM). 2 males--Jamaica B.W.I.; Kingston Insti-; tute Library; Summer 1957; T.H.Farr (IJSM). 1 male--B.W.I., Jamaica; St. Andrew; Crossroads; 22 Sept. 1954; T.H.Farr (DMAG). 1 male--ibid. 27.10.1949; R.P.Bengry (IJSM). 1 female--Jamaica B.W.I.; St. Andrew; Halfway Tree; Collins Green; July 24 1959; A.M.Wiles (JMIC). 1 female--Jamaica B.W.I.; St. Andrew; Beverley Hills; Aug. 1958; R.P.Bengry (DMAG). 1 male-- Jamaica B.W.I.; St. Andrew; Upper Mt. View; 8 March 1956; C.B.Lewis (DMAG). 1 female--St. Andrew; Upper Mtn.; View Ave.; Oct. 1944; C.B.Lewis (DMAG). 1 female--Jamaica IW.; St. Andrew; Beverly Hills; Dec. 1961; R.P.Bengry (JMIC). 1 male--Jamaica, W.I.; St. Andrew; Beverly Hills; 3 Jan. 1960; R.P.Bengry (DMAG). 1 male--ibid. 23.Aug.1961 (IJSM). 1 male--B.W.I., Jamaica; St. Andrew; Half Way Tree; June 1952; R.P.Bengry (DMAG). 1 ; 93-25/ INSTITUTE

OF JAMAICA; 111 Duke St.; Kingston Sept.7.; ISAC 1891
(BMNH).

Etymology. This species is named after the island of origin.

Discussion. M. jamaicensis is the one of the least morphologically variable West Indian Methia species. This can be partially explained by the isolation of Jamaica. Even during maximum lowering of the sea levels during the Pleistocene, Jamaica was still the most isolated of the West Indian islands (Buskirk, 1985). Probably after the initial colonization of this island by the ancestor of this species, there have rarely been recolonization events. This is contrary to the hypothesized situation in most of the other islands in the West Indies, where due to island proximity, relatively continual gene flow once occurred and perhaps still does. Another important factor possibly contributing to the low variability of this species is that during warmer periods and higher sea levels, the island was not partitioned ecologically or geographically (Buskirk, 1985). This is not the case for Cuba and Hispaniola which, based upon current highland areas, were subdivided into smaller landmasses (Brown, 1978), with submergence of the depressed zones between these areas or blocks (Donnelly, 1988). These subdivisions are supported by the subspecies of some sedentary species

of butterflies, especially the genus Calisto (Brown, 1978). Jamaica though, has only one uniform species of that genus.

Methia caymanensis New Species

Diagnosis. M. caymanensis is characterized by parallel sided, elongate lobes of the prementum (fig. 22), uncleft male parameres (fig. 15), and a relatively consistent elytral pattern (fig. 11). I suspect that specimens of M. caymanensis will occasionally be found with a vestigial cleft in the paramere, but generally this character alone should separate this species from the others.

Description. Male. Form elongate slender, slightly tapering. Integument brown to testaceous. Elytron brown at humeral angle, at apical 1/3, and extreme apex, other areas testaceous to pale (fig. 11). Head at eyes wider than pronotum, sometimes inflated on vertex behind eyes, front areolate-rugose, slightly less so on vertex, densely, irregularly punctate at posterior margin; upper and lower eye lobes slightly separated or connected by one row of facets; antennae extending beyond the abdominal apex by about 4 segments, scape apex with a slight tooth. Postmentum of the labium width to length ratio about 2.5:1; prementum lobes elongate, parallel sided. Pronotum

slightly broader than long, sides broadly, irregularly rounded, except subparallel at apical $1/6$ and basal $1/6$; disc finely, densely rugose-punctate, slightly impressed transversely near anterior and posterior margins; usually two very slight, irregularly shaped callosities at anterior $1/4$ on each side of midline, callosities sometimes extended longitudinally towards base; usually a relatively smooth, longitudinally ovoid maculation medially around basal $1/4 - 1/3$, sometimes slightly raised; callosities and maculation usually relatively paler than surrounding areas. Stridulatory plate of mesonotum smooth without a median line; prosternum very finely rugose-punctate with sparse long erect setae; mesosternum more densely, finely rugose-punctate with moderately dense suberect setae; metasternum finely, regularly punctate, with moderately dense suberect setae. Elytra extending past second abdominal segment, rounded at apex; each elytron vaguely tricostate, except obsolete at apex; punctures moderately dense, separate, becoming finer towards apex; pubescence suberect, pale; each elytron dark brown at basal $1/3$, usually slightly lighter along suture, also dark brown from around apical $1/6$ to $1/3$ in a transverse irregular band and at apex; pale testaceous at preapical depression and from basal $1/3$ to apical $1/3$, except brown laterally. Abdomen moderately, finely,

evenly punctate with moderately dense setae, fifth sternite broadly emarginate. Femora finely, transversely plicate. Male paramere as in fig. 15. Labium as in fig. 22. Length: 6.2-7.5 mm.

Female. Usually larger with more elongate elytra, elytra sometimes extending past third abdominal segment. Antennae extending past the abdomen by 4-5 segments. Apex of last abdominal sternite deeply emarginate. Female genitalia as in fig. 27. Length: 5.8-10.8 mm.

Etymology. This species is named after the group of islands on which it is distributed.

Distribution. This species is found throughout the Cayman Islands, including Grand Cayman, Little Cayman, and Cayman Brac.

Material Studied. Holotype (female) labelled 29.iv.1938.; Grand; Cayman,; West end of,; Georgetown.; Light trap./17.iv-26.viii,; 1938. Oxf Un.; CAYMAN IS.; Biol. Exped.; coll. by C.B.; Lewis, G.H.; Thompson. (BMNH). 13 Paratypes: 1 female--ibid. 1.v.1938 (BMNH). 1 female--ibid. 26.vi.1938 (BMNH). 1 male--17.vi.1938.; Grand; Cayman,; S. coast of,; South Sound.; Light trap B./17.iv-26.viii,; 1938. Oxf Un.; CAYMAN IS.; Biol. Exped.; coll. by C.B.; Lewis, G.H.; Thompson (BMNH). 1 male--21.v.1938.; Cayman Brac,; West end of; Cotton-tree; Land.; Light trap B./17.iv-26.viii,; 1938. Oxf Un.; CAYMAN

IS.; Biol. Exped.; coll. by C.B.; Lewis, G.H.; Thompson (BMNH). 1 female--19.v.1938.; Cayman Brac; N coast of; Stakes Bay.; Light trap./17.iv-26.viii,; 1938. Oxf Un.; CAYMAN IS.; Biol. Exped.; coll. by C.B.; Lewis, G.H.; Thompson (BMNH). 1 female--ibid. 21.v.1938 (BMNH). 1 female--30.v.1938.; Little Cayman,; S. coast of,; South Town.; Light trap B./17.iv-26.viii,; 1938. Oxf Un.; CAYMAN IS.; Biol. Exped.; coll. by C.B.; Lewis, G.H.; Thompson (BMNH). 1 female--Georgetown; GRAND CAYMAN; 15-30.III.1965; J.R.McLintock (CNCI). 2 females--Grand Cayman; Cayman Islands; W I; XII 2 1980/ Prospect; trap K/ M E C Giglioli colr (UCDC). 1 female--ibid. XI 19 1980/ West Bay; trap Y (UCDC). 1 female--GRAND CAYMAN IS. B.W.I.; Georgetown; 16 Sept 1973; E.J.Gerberg/ at light (EJGC). 1 female--Grand Cayman, BWI; Boatswain Point; 21 June 1976; E.J.Gerberg (EJGC).

Discussion. Similar to the situation on Jamaica, the Cayman Islands also appear to have a relatively nonvariable endemic species, M. caymanensis, possibly due to their isolated position and small size. There is some variability in this species in the development of the elytral markings.

The decision to describe this population as a new species may be looked upon as somewhat subjective. Mayr (1969) states that isolated allopatric populations may be

looked upon as species or subspecies and the decision is arbitrary. Based on two very consistent characters, the elongate, parallel sided prementum lobes and uncleft male parameres, I have decided to give this population species status. This species is closely related to M. necydalea.

Methia necydalea (Fabricius)

Saperda necydalea Fabricius, 1798: 148.

Methia necydalea: Gahan, 1895: 122. Aurivillius, 1912: 39.

Leng and Mutchler, 1914: 444 (in part). Fisher, 1932:

7. Wolcott, 1941: 98; 1950: 334. Beatty, 1944: 141.

Blackwelder, 1946: 559 (in part). Ramos, 1946: 41.

Fattig, 1947: 7. Cazier and Lacy, 1952: 46. Linsley,

1962: 37. Gilmour, 1963: 96; 1968: 97. Chemsak and

Linsley, 1964: 159; 1982: 12. Chemsak, 1966: 211;

1967: 182; 1969: 186. Miskimen and Bond, 1970: 94.

Zayas, 1975: 52. Villiers, 1980: 269.

Methia necyaalea: Wolcott, 1923: 109. [misspelling]

Thia pusilla Newman, 1840: 18.

Methia pusilla Newman, 1842: 418. LeConte, 1852: 144.

Chevrolat, 1862: 256. Fleutiaux and Sallé, 1889: 468

Gundlach, 1891: 218. Leng and Hamilton, 1896: 162.

Craighead, 1923: 41 (larva). Cazier and Lacy, 1952:

46. Linsley, 1962: 36. Gilmour, 1968: 94. Turnbow and

Hovore, 1979: 220. Turnbow and Franklin, 1980: 341.
Turnbow and Wappes, 1981: 75. Chemsak and Linsley,
1982: 12. NEW SYNONYMY.

Obrium ? dejeanii Haldeman, 1847 Trans. Amer. Philos.
Soc., (2)10: 42.

Methia punctata LeConte, 1873: 240. Leng and Hamilton,
1896: 163. Aurivillius, 1912: 39. Leng and Mutchler,
1914: 444; 1917: 209. Blackwelder, 1946: 559.
Wolcott, 1923: 109; 1950: 334. Gilmour, 1968: 99.
Zayas, 1975: 53. Chemsak and Linsey, 1982: 12. (From
Wolcott, 1923:109: Gundlach, 1894; Stahl, 1882). NEW
SYNONYMY.

Methia constricticollis Schaeffer, 1908: 351. Aurivillius,
1912: 39. Linsley, 1962: 31. Chemsak and Linsley,
1964: 159; 1982: 12. Gilmour, 1968: 96. Turnbow and
Wappes, 1978: 367; 1981: 75. Hovore et.al. 1987: 295.
Chemsak and Feller, 1988: 181. NEW SYNONYMY.

Methia pallida Fisher, 1932: 6. Blackwelder, 1946: 559.
Chemsak, 1966: 211. Gilmour, 1968: 94. Chemsak and
Linsley, 1982: 12. NEW SYNONYMY.

Methia pulchra Chemsak and Linsley, 1964: 159; 1982: 12.
Gilmour, 1968: 96. NEW SYNONYMY.

Methia insularum Chemsak, 1966: 210. Gilmour, 1968: 97.
NEW SYNONYMY.

Methia impressicollis Chemsak, 1966: 211. Gilmour, 1968:

Methia taina Zayas, 1975: 53, fig. 6d. Chemsak and
Linsley, 1982: 12. NEW SYNONYMY.

Tessaropa luctuosa Zayas, 1975: 54, fig. 7a. Chemsak and
Linsley, 1982: 13. NEW SYNONYMY.

Methia rhizophorae Chemsak and Feller, 1988: 181. NEW
SYNONYMY.

Diagnosis. Methia necydalea has triangular premental lobes (fig. 23), a relatively long postmentum (figs. 23), and male parameres smoothly rounded in the anterior portion of the cleft (fig. 18). A few specimens of M. necydalea approach the cleft sharpness of M. jamaicensis, but never to quite the same degree. Methia necydalea also has a great range in cleft depth, ranging from practically no cleft (fig. 16) to a cleft $3/4$ the total length of the main paramere body (fig. 17). The elytral pattern is extremely variable (fig. 12).

Description. Male. Form elongate slender to slender. Integument dark brown to pale testaceous. Elytra color and pattern extremely variable (fig. 12) but usually brown at humeral angle, transversely at apical $1/3$, and at apex. Head at eyes wider than pronotum, sometimes inflated on vertex behind eyes, front areolate-rugose, less so on vertex, usually densely, irregularly punctate at posterior margin; upper and lower eye lobes separate or joined by one or two rows of facets; antennae

extending beyond abdominal apex by about four segments; apex of scape sometimes with a slight tooth; postmentum of the labium width to length ratio about 2.5:1, prementum lobes triangular shaped, sometimes relatively blunt with rounded apices. Pronotum slightly broader than long, sides broadly, sometimes irregularly rounded, parallel or subparallel at apex and base; base occasionally very strongly constricted, narrower than at apex; disc usually finely to coarsely, densely rugose-punctate, slightly to moderately impressed transversely near anterior and posterior margins; often two very slight, irregularly shaped callosities at anterior $1/4$ on each side of midline, sometimes extended longitudinally towards base, usually a relatively smooth, longitudinal maculation medially around basal $1/3$ or $1/4$, rarely slightly raised; callosities and maculation, or if not present, the same area usually relatively paler than surrounding areas; sometimes also relatively pale in longitudinal band from and including callosities to just before basal transverse impression, band expanded transversely laterally near middle; sometimes relatively paler at apical and basal margin. Stridulatory plate of mesonotum smooth without a median line; prosternum very finely rugose-punctate with sparse long erect setae; mesosternum more densely, finely rugose-punctate with moderately dense suberect setae;

metasternum finely, regularly punctate, with moderately dense suberect setae. Elytra extending past second abdominal segment, rounded at apex; each elytron sometimes distinctly tricostate, costae becoming finer towards apex; pubescence suberect, occasionally some erect setae, setae pale; each elytron sometimes almost completely only pale testaceous or dark brown, with humeral or apical margin contrasting light or dark; more usually a pattern consisting of a relatively darker humeral angle, an irregular, transverse dark band at apical $2/5$, and a dark apex; transverse band sometimes split at middle, with outer part sometimes extending longitudinally to humeral angle and inner part, near or including suture, sometimes longitudinally extended to apex; sometimes pattern consisting of relatively pale longitudinal areas on disc at basal $1/3$ to middle and at apical $1/5$ with other areas darker. Abdomen moderately, finely, evenly punctate with moderately dense setae, fifth sternite broadly emarginate. Femora finely, transversely plicate. Male paramere as in figs. 16-18. Labia as in fig. 23. Length 3.9-8.3 mm.

Female. Usually larger, often with more elongate elytra. Antennae extending past the abdomen by 4-5 segments. Apex of last abdominal sternite deeply emarginate. Female genitalia as in figure 28. Length 4.7-9.6 mm.

Distribution. This species is a very wide ranging circum-Caribbean species. It is found from Virginia down through the east coast to Florida, around the Gulf of Mexico and Caribbean coast to Belize. It also occurs throughout the West Indies except the Cayman Islands, Jamaica, and Barbados (Bennett and Alam, 1985). Island records for the West Indies are Beatty (1944), Blackwelder (1946), and Cazier and Lacy (1952).

Material Studied: See appendix C.

Discussion. Several names have been proposed for specimens referable to M. necydalea. The earliest described species of Methia was Saperda necydalea Fabricius (1798) from St. Thomas in what is now the U.S. Virgin Islands. In 1840, Newman described Thia pusilla from East Florida later (1842) proposing Methia for the preoccupied Thia. LeConte (1873) described M. punctata, based on specimens from Cuba and the Dominican Republic. Methia constricticollis Schaeffer was described from Brownsville, Texas (Schaeffer, 1908) and three specimens from Haiti were named M. pallida by Fisher (1932). Chemsak and Linsley (1964) described M. pulchra based on types from Cozumel and Isla Mujeres, Quintana Roo, Mexico. Chemsak (1966) continued Caribbean work by describing Methia insularum and M. impressicollis from Virgin Gorda and Jost van Dyke in the British Virgin Islands. The most

recently named West Indian species are M. taina and Tessaropa luctuosa from Cuba (Zayas, 1975). Methia rhizophorae Chemsak and Feller (1988) from Belize, was the latest synonym erected.

The species synonymized here are based upon variable characters, such as color, elytral shape, eye facet connection, and degree of basal pronotal constriction. Another major factor contributing the number of synonymies of M. necydalea is the small series sizes used to describe new species, and additionally, these series often being collected from a single locality. Specimens within a series with the same label data are sometimes very similar in shape and color. Although many authors did not examine types, this action probably would not have affected the number of descriptions. Indeed, the number of species described does not seem unusual, in light of the extremely variable nature of this species.

The results of this morphological study have determined that all species described from the West Indies, *sensu stricto*, are synonyms of Methia necydalea. Additionally, four species described from mainland America, M. pusilla, M. constricticollis, M. rhizophorae, and M. pulchra, are also considered synonyms of this Fabrician species. Specimens of M. taina and Tessaropa luctuosa from Cuba have not been seen and the types are currently unavailable, but based on the written

currently unavailable, but based on the written descriptions and illustrations, both appear to represent variants of M. necydalea.

Many morphological forms of M. necydalea are present in the West Indies. The species M. pallida and M. insularum were both based upon the pale forms. Most of the other species are based upon some of the other phenotypes and characterized on highly variable characters discussed previously. Due to a lack of geographic trends in these forms, subspecies applications were deemed inappropriate. It should be noted that the localities of selected illustrated body parts are for documentation only, and do not indicate morphological island types.

It was difficult to determine if the widely disjunct series described as M. rhizophorae is truly conspecific with M. necydalea, without available samples between the type locality of Belize and other areas of Mexico, where M. necydalea is known to occur. Methia rhizophorae is defined on the basis of the highly variable characters of coloration, the width of the dorsal and ventral eye lobe connection, and often variable head punctation. All these characteristics, including the unique coloration of the female, have been seen in specimens from the West Indies and the USA. With the very plastic nature of M. necydalea and some other species of Methia examined during the

course of this study, I feel it is reasonable to conclude that they are the same species.

A paratype of M. pulchra, from Cozumel, has a labium with short, relatively blunt, premental lobes. I can separate this population by no other character. Specimens of M. necydalea examined from the Bahamas and parts of eastern Mexico have lobe shapes very similar in form. For this reason, I feel it is reasonable to also place M. pulchra in synonymy.

Although both these two latter synonymies are presently not easy to defend, due to the lack of specimens available from these regions of Mexico, the hypothesized taxonomy will be possible to test in the future with additional specimens.

The variability of Methia necydalea in the West Indies may be explained by its existence on a large number of islands, none of which have been isolated for long enough to evolve unique, endemic species. Probably due to founder effects (Mayr, 1971), intra-island variation is lower than inter-island variation, from areas which have adequate samples. This can be seen particularly well in specimens from Hispaniola compared to Puerto Rico. Also, in relatively large series collected from the Virgin Islands, specimens from within each island show less variation compared to inter-island populations in this area. Gene flow may continue between some of the islands

although at slower rates than would normally occur on a continuous land mass. This rate probably has not been constant due to eustatic changes altering the sizes of and distances between the islands. Islands which have become larger and simultaneously closer to adjacent land masses are likely to have higher rates of gene flow (MacArthur and Wilson, 1967). Specimens from mainland regions exhibit relatively little variation compared to island populations perhaps because of the lack of barriers to gene flow.

Among mainland specimens examined, variation is relatively high in Florida. For example, there are two males and one female from southern Florida (Monroe and Dade Co.) which have a unique pronotal shape consisting of slight concavities dorso-laterally and a pronotal base extremely constricted (fig. 7G). There is another pair (one male and one female) from north-central Florida (Marion Co.) which have elytra unicolorous brown except for the apical 1/5 which is pale yellow brown (fig. 12I). This variation could be due to Pliocene and Pleistocene sea level increases having greater effects in Florida compared to other mainland regions. For example, the Florida Keys have been a continuous land mass which extended 110 km west of Key West during the last, or Wisconsinan glacial period of the Pleistocene (Peck,

1989). Rising sea levels created the Florida Keys, resulting in divided populations of M. necydalea. Higher water levels during warmer periods most likely isolated parts of central Florida (Howden, 1969). These divisions could possibly result in at least a reduced rate of gene flow between these small populations and would account for the increased variability in specimens from Florida. Lowering sea levels, creating newly exposed but isolated areas, might also create more intraspecific variation if they were colonized by a founder.

Methia necydalea has a very broad a host range. In Puerto Rico, it has been collected on dead Guamá (Inga fagifolia (L.) Willd.), a member of the Mimosaceae (from label data cited in appendix). In Twin Keys, Belize, it is associated with red mangrove (Rhizophora mangle L.), black mangrove [Avicennia germinans (L.) Stearn], white mangrove [Laguncularia racemosa (L.) Gaertn. f.], and buttonwood [Conocarpus erectus (L.)] (Chemsak and Feller, 1988). Larvae have been described for M. necydalea and were collected with adults in small branches of Taxodium in Georgia (Craighead, 1923). Turnbow and Hovore (1979) report rearing specimens from dead branches and twigs of an oak (Quercus virginiana Miller). Other hosts include Celtis (Turnbow & Wappes, 1978), Zanthoxylum (Turnbow & Wappes, 1981), and probably also Eugenia and Amyris (Wolcott, 1950). The verified hosts of M. necydalea

belong to both Gymnosperms and Angiosperms, two vastly different plant groups, indicating a very broad host range.

It is possible that more species of Methia exist in the West Indies than are presently recognized in this study. Without more biological data, especially regarding host specificity, these possible sibling species are impossible to morphologically differentiate. Therefore, a more simplistic view is currently the best taxonomic estimate.

