



A revision and phylogenetic analysis of *Trichrous* Chevrolat 1858, and a review of *Plectocerum* Dejean 1835 (Coleoptera:Cerambycidae:Elaphidiini)
by Kelvin Antonio Guerrero

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:

Trichrous Chevrolat was found to be polyphyletic, with 17 named forms belonging to 2 tribes, 5 lineages, and 15 species. Three species are recognized in the redefined elaphidiine genus *Trichrous*: *T. irroratus* (Olivier), *T. jaegeri* Chevrolat, and *T. nigripes* Fisher. The monophyly of *Trichrous* sensu nov. is supported by synapomorphies of the hypomeron punctation (relative to disc) and pronotal shape. The relationship between the included species was hypothesized as [[*T. irroratus*, *T. nigripes*] *T. jaegeri*]. This monophyletic genus is endemic to Hispaniola. *Trichrous* bicolor Fisher (not Salle) is placed under *T. jaegeri* Chevrolat as a NEW SYNONYMY.

Poeciloderma lineolatus White and *T. pilipennis* Chevrolat are moved to *Plectocerum* Dejean as *P. lineolatum* (White) NEW COMBINATION and *P. pilipenne* (Chevrolat) NEW COMBINATION. Eleven names are provisionally removed to the heteropsine genus *Heterops*: *Mallosoma bicolor* Salle, *Poeciloderma terminalis* White, *Poeciloderma basalis* White, *T. brevicomis* Zayas, *T. dimidiatipennis* Chevrolat, *T. divisus* Chevrolat, *T. jamaicensis* Chevrolat, *T. major* Gahan, *T. prasinus* Cazier and Lacey, *T. violaceipennis* Fisher, and *T. vittatus* Fisher are now treated as *H. bicolor* (Salle) NEW COMBINATION, *H. terminalis* (White) NEW COMBINATION, *H. basalis* (White) NEW COMBINATION, *H. brevicomis* (Zayas) NEW COMBINATION, *H. dimidiatipennis* (Chevrolat) NEW COMBINATION, *H. divisus* (Chevrolat) NEW COMBINATION, *H. major* (Gahan) NEW COMBINATION, *H. prasinus* (Cazier and Lacey) NEW COMBINATION, *H. violaceipennis* (Fisher) NEW COMBINATION, and *H. vittatus* (Fisher) NEW COMBINATION. *Trichrous jamaicensis* Chevrolat is placed as a NEW SYNONYM of *H. basalis* (White) *Heterops fisheri*; NEW REPLACEMENT NAME replaces the junior secondary homonym *H. bicolor* Fisher. The monophyly of *Trichrous* sensu nov. is supported by synapomorphies of the hypomeron punctation (relative to disc) and pronotal shape. The relationship between the included species was hypothesized as [[*T. irroratus*, *T. nigripes*] *T. jaegeri*]. This monophyletic genus is endemic to Hispaniola.

All species of *Trichrous* and *Plectocerum* are diagnosed, redescribed, illustrated and keys are provided for their identification.

Disclaimer: This thesis not intended to meet the provision of the ICZN (1999) regarding publication of new nomenclatural acts [Art. 8.5.2.]. No name proposed herein should be considered available as defined by the ICZN

A REVISION AND PHYLOGENETIC ANALYSIS OF *TRICHROUS* CHEVROLAT
1858, AND A REVIEW OF *PLECTOCERUM* DEJEAN 1835 (COLEOPTERA:
CERAMBYCIDAE: ELAPHIDIINI)

by

Kelvin Antonio Guerrero

A thesis submitted in partial fulfillment

of the requirements for the degree

of

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in

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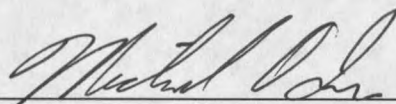
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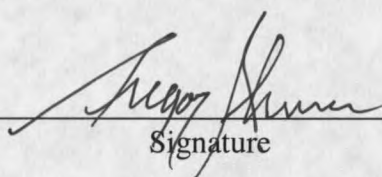
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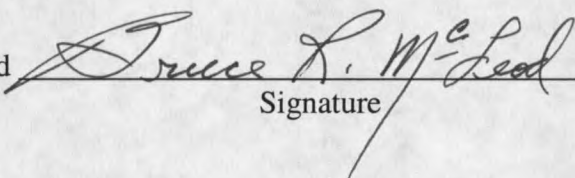
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This thesis has been read by each member of the thesis committee and has been found to be satisfactory regarding content, English usage, format, citation, bibliographic style, and consistency, and is ready for submission to the College of Graduate Studies.

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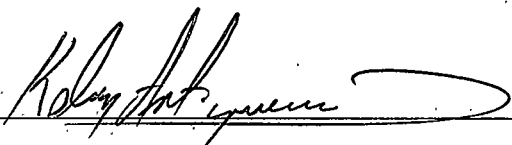
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ABSTRACT

Trichrous Chevrolat was found to be polyphyletic, with 17 named forms belonging to 2 tribes, 5 lineages, and 15 species. Three species are recognized in the redefined elaphidiine genus *Trichrous*: *T. irroratus* (Olivier), *T. jaegeri* Chevrolat, and *T. nigripes* Fisher. The monophyly of *Trichrous sensu nov.* is supported by synapomorphies of the hypomeron punctation (relative to disc) and pronotal shape. The relationship between the included species was hypothesized as [[*T. irroratus*, *T. nigripes*] *T. jaegeri*]. This monophyletic genus is endemic to Hispaniola. *Trichrous bicolor* Fisher (not Sallé) is placed under *T. jaegeri* Chevrolat as a NEW SYNONYMY.

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CHAPTER 1

INTRODUCTION

The Cerambycidae is one of the largest families of Coleoptera, with an estimated 20,000 described species worldwide (Linsley, 1961, Yanega, 1996). The family is among the most widespread, and occurs throughout the vegetated parts of the terrestrial world (Yanega, 1996). Their larvae are mostly internal feeders in the woody parts of vascular plants, and as a family, utilize an extremely wide host range (Linsley, 1961; Monné and Giesbert, 1995). However, many species are highly specific in host range (Linsley, 1961)

Cerambycidae are common on islands, where they have a tendency to evolve endemic species, specialized in host, predator, and habitat relationships (Linsley, 1961). The West Indies, where a very large and highly endemic fauna has evolved (Gahan, 1895; Zayas, 1975) are no exception.

Although long a favorite with amateur collectors, the classification of the Cerambycidae is very poorly worked out. Large numbers of species remain to be described, while others have been renamed over and over. Many, if not most, genera lack coherent definition. The last worldwide revision of tribes was done nearly a century- and-a-half ago (Thompson, 1864; Lacordaire, 1869). This leaves a biodiverse taxon, with many interesting biogeographic and biological relationships, virtually unknown to evolutionary workers.

Recently, the situation has begun to improve. The seminal work by Napp (1994) provides the first attempt to look at the Cerambycidae in a phylogenetic framework.

Some groups, notably parts of the Prioninae (Galileo, 1987a, 1987b) have been revised using modern concepts, and Brazilian school cerambycidologists (Martins, Monné, Fragoso, Galileo, Napp, etc.) have been making particularly great strides in recent years.

The classification of the largest subfamily, the Cerambycinae, however, remains a problem (Fragoso, et al., 1987; Napp, 1994). Convergence is widespread, and the size of the group makes it difficult to assemble the correct members for any phylogenetic revision. An important step forward is the work of Lingafelter (1998), whose revision of the Elaphidiini provided a starting point for further refinement, and in fact made this study possible by providing a modern set of apomorphies for deciding tribal placement in this difficult group.

The West Indies are home to a great diversity of Cerambycidae. The last, and to date only, revision of the West Indian species is that of Gahan (1895). Since that time the checklists of Blackwelder (1946), Monné (1993), and Monné and Giesbert (1995) have included the West Indies in larger works. The only modern, phylogenetically based revision of a specifically West Indian group of cerambycines is that of Philips and Ivie (1998) for a single tribe. Island faunal treatments have been published for the Bahamas (Cazier and Lacey, 1952; Brown, et. al., 1993), Cuba (Zayas, 1975), Jamaica (Gowday 1926), Cayman Islands (Fisher 1941, 1948), Puerto Rico (Wolcott, 1948), the French Antilles (Villers, 1980abc), Dominica (Villers, 1980e), Barbados (Bennet and Alam, 1985) and Grenada (Woodruff, et al., 1998). These range from the excellent and detailed

treatments of Villiers (1980abc) and Zayas (1975), through more limited keys like the work of Cazier and Lacey (1952), vouchered checklists like Gowdy (1926), to simply poorly documented lists like Woodruff, et al (1998). However, all of these treatments share the lack of regional coordination, and suffer from insularity. Taxa are impossible to compare between islands or regions, and the error prone approach leaves the problem of identification of West Indian cerambycids unsatisfactory. The most species of the West Indies, Hispaniola, remains largely unreported and inaccessible. Many taxa are so misplaced that it is virtually impossible to identify a specimen unless one has access to either a nearly complete voucher collection, or the types themselves. These problems will be exposed in detail in this work.

In an attempt to contribute to progress in the understanding of the West Indian Cerambycidae, I have undertaken the revision of a purportedly mimetic genus (Darlington, 1938 and Parson, 1940) of cerambycines, currently in the Heteropsini (Monné and Giesbert, 1995). In the course of this study, we have discovered that the genus is polyphyletic, with 4 major lineages belonging in 2 different tribes, with close relatives that were previously placed in another tribe. My conclusions must be viewed as a work in progress, as I have not solved all the problems even within the restricted, monophyletic remnant of the former group, and have produced perhaps more problems than I have solved. However, I hope that our contribution will be seen as a step in the right direction, and our progress will contribute to the eventual goal of a phylogenetically based classification for the Cerambycinae.

The present study builds on a preliminary cladistic analysis of the Elaphidiini by Lingafelter (1998). In his original analysis the West Indian genera *Trichrous* Chevrolat, *Nesiosphaerion* Martins and Napp, *Nesanoplium* Chemsak, and *Plectocerum* Dejean were not included, due to limited material of these genera or misplacement in the Heteropsini. His analysis of 99 taxa included 70 characters only 57 of which were found to be informative. In the course of working with his matrix, several errors were discovered (Lingafelter, pers. com.), further weakening the data set because correcting them were beyond the scope of this study. Preliminary reanalysis of his data set with the addition of the 4 genera (103 taxa) showed conclusively that all were member of the tribe Elaphidiini, but 935 similar length trees gave highly unstable positions, and a consensus tree was so unresolved as to be uninformative beyond supporting the move of *Trichrous* and *Plectocerum* to the Elaphidiini. Because the point of this reanalysis was to test the initial hypothesis that *Trichrous* s.s. and *Plectocerum* belonged in the Elaphidiini, but are not necessarily closely related within the tribe, and because clear synapomorphies for that tribe (Lingafelter 1998, pers. com.) are present in both genera, no further discussion or presentation of this analysis is given. The starting point for this thesis, therefore, is that *Trichrous* and *Plectocerum* belong in the Elaphidiini and their membership must be adjusted to deal with this change.

CHAPTER 2

MATERIALS

The current study was based on the examination of approximately 350 adult specimens of the genera, *Trichrous* Chevrolat, *Plectocerum* Dejean, and other species of related genera. Larval characters were not available for this study because the larvae of all species are unknown.

This study brought together the specimens of these 2 genera deposited in the entomological collections of most of the European and North American museums, and private collections. Despite repeated requests, specimens deposited in the entomological collections of Jamaica and Cuba were not available for this revision. They remain a potential sources of additional data. Although some species were represented by small series, the amount of material was sufficient to delimit each species based on consistency of morphological characters. Specimens were obtained from the following institutions and collections. The curator responsible is listed in parenthesis:

AMNH - American Museum of Natural History, (Lee Herman).

BMNH - The Natural History Museum, London, (Sharon Shute).

CMNH - Carnegie Museum of Natural History, Pittsburgh, Pennsylvania (John Rawlins).

CMN - Canadian Museum of Nature, Ottawa, Ontario, (Francois Génier).

EGPC - Ed Giesbert, private collection, (transferred to FSCA, Michael C. Thomas, and Frank Havore).

EMPC - Eugenio Marcano, private collection, Santo Domingo.

FMNH - Field Museum of Natural History, Chicago, Illinois (Philip P. Parrillo).

FSCA - Florida State Collection of Arthropods, Gainesville, Florida. (Michael C. Thomas).

ISNB - Institut royal des Sciences naturelles de Belgique, Brussels (Dr. P. Grootaert, and J. Cools).

JWPC - Jim Wappes, private entomological collection, Buvelde, Texas.

MMBC - Moravian Museum, Brno, Czech Republic (Jiří Kolibábě)

MHND - Museo Nacional de Historia Natural, Santo Domingo. (Carlos Rodríguez).

MZC - Museum of Comparative Zoology, Cambridge, Massachusetts (Philip Perkins).

NMNH - National Museum of Natural History, Washington, D.C. (Steven Lingafelter & David G. Furth).

NMPC - National Museum Natural History, Prague (Dr. J. Jelinek)

RHTC - Robert H. Thurnbow, private collection, Fort Rucker, Alabama.

WIBF - West Indian Beetle Fauna Project, Montana State University, Bozeman Montana, U.S.A. (Michael A. Ivie).

ZMAN - Zoologisch Museum, Amsterdam, Nederland (Ben Brigge).

CHAPTER 3

METHODS

Because this study is based on morphological characters of the adult specimens, the operational species concept of Whitehead (1972) is followed. Such a concept allows us to delimit species based on unique morphological characteristics of a species that are hypothesized to have a genetic basis. Novel fixed traits by means of drift.

Specimens were examined and sorted based on external similarity. Looking at the consistency among the groups of specimens and comparing them with populations from other islands and localities, I was able to make species assignment based on Whitehead's definition of morphological groups. This result is a hypothesis of species that is testable with future discoveries.

Dissection and disarticulation in order to study different morphological parts (i. e. mouthparts, wings, genitalia) was used extensively. Prior to dissection, specimens were first relaxed in hot water (90 –100 °C) for 5 to 10 minutes.

Thus hydrated, they were transferred to 5% or 10% KOH solution overnight, for removing the fat, muscles, and tissue. Next, they were washed with a 10% hydrogen peroxide solution, and distilled water.

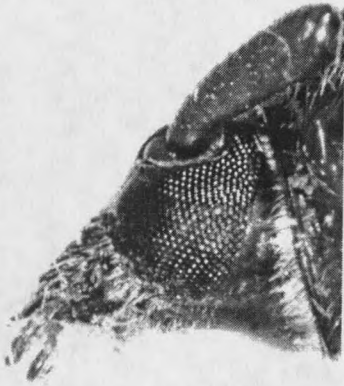
The head, prothorax, abdomen, elytra, hind wings, legs, and genitalia were then separated, rinsed, and temporarily placed on slides in glycerin. After study, these structures were stored in genitalia vials or glued to a card, and placed on the specimen

pin. These parts were used as character sources for the phylogenetic analysis, and to compare morphological structures within the species. I have followed Sharp and Muir (1912), Lawrence and Britton (1994), and Lingafelter (1998) for the nomenclature of wing venation and genitalia.

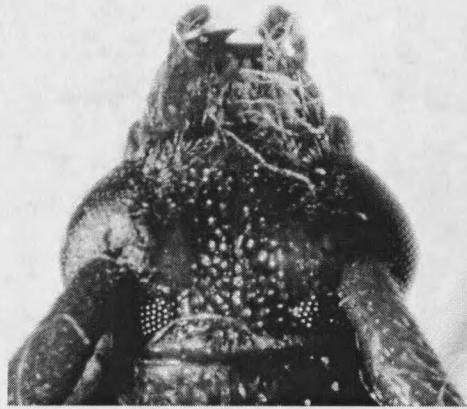
Nomenclature for surface sculpture of the integument followed the glossary of surface sculpturing by Harris (1979). Several of these terms have been inconsistently or incorrectly used in cerambycids. Alveolate refers to a honeycomb pattern, with regular deep flat-bottomed cavities, separated by flat-topped partitions (e.g. pronotum *T. jaegeri*, Fig. 1C). In contrast, in areolate sculpture the surface is divided into a number of small irregular spaces by thin, acute ridges (e.g. *T. irroratus*). Often, these areolae form longitudinal strigulae, which I mention as sub-strigulate (Fig. 1D).

Specimens were studied on a Wild M5A stereoscope equipped with fiber optical illumination. Drawings were made with the aid of a drawing tube, measurements were made using a micrometer eyepiece and vernier caliper. The photos of the adults were taken with a digital camera system, Olympus DP11, mounted on a Wild M3C. For editing the photos and images Photoshop 5.5® and Microsoft Photo Editor® 3.0 were used.

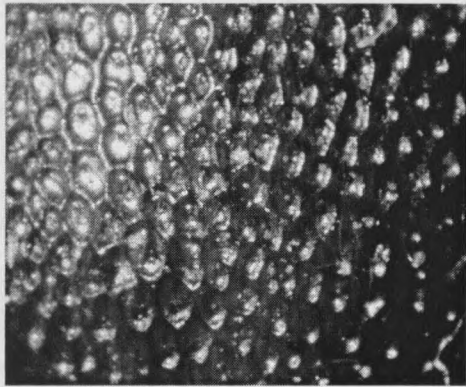
The computer software PAUP (Phylogenetic Analysis Using Parsimony) version 3.1 (Swofford 1991) was used for cladistic analyses. MacClade® version 4 (Madison and Madison, 2000) was used for visualization and tracing of characters. Both programs were run on Mac OS 8.6 with processor PCG3 at 400MHz, and memory of 128 RAM. The recent revision of the genera of Elaphidiini (Lingafelter 1998) facilitated the selection of characters, and outgroups, as well as defining the character state coding for *Trichrous*.



A



B



C



D



E

Figure 1: (A) Head lateral view, (B) Head dorsal view, *T. irroratus*; (C) Alveolate punctation of pronotum, *T. jaegeri*; (D) Areolate punctation pronotum, *T. irroratus*; (E) Pronotal hypomeron of *T. nigripes*.

The character polarization was made under the principle of outgroup comparison outlined by Watrous and Wheeler, 1981 (see table 2).

The relationships among the taxa are hypothesized on the basis of synapomorphies (i.e. shared derived characters), and parsimony. The cladistic principles outlined by Wiley (1981), Wiley et. al (1991) and Lipscomb (1998) were used to interpret the results of the phylogenetic analysis.

Finally, M.A. Ivie or I examined the type of most species, with the exception of *T. brevicornis* (Zayas collection in Havana), *T. bicolor*, and *T. pilipennis* (MNHN, Paris). The label transcription of each type specimen examined follows Ivie (1985). Data on each label is separated by "/" (backslash); each line of within the label is separated by ";" (semicolon). Notes, additions and comments about each specimen or label is placed within "[]" (brackets).

CHAPTER 4

REVISION OF THE GENUS *TRICHROUS* CHEVROLAT

The genus *Trichrous* was described by Chevrolat (1858) for the species *Poeciloderma basale* White, *Trichrous divisus* Chevrolat, *Trichrous dimidiatipennis* Chevrolat, *Callidium irroratus* Olivier, *Trichrous jaegeri* Chevrolat, *Trichrous jamaicensis* Chevrolat. Since Chevrolat did not designate a type species for the genus, Thomson (1864) designated *T. irroratus* as the type species. Laçordaire (1869) placed *Trichrous* in the tribe Heteropsini of the subfamily Cerambycinae, and added *Mallosoma bicolor* Sallé (1856) to the genus. Gahan (1895) transferred *Poeciloderma terminale* White and *P. lineolatus* White to *Trichrous* in his revision of West Indian cerambycids, and described *T. major*. Fisher (1932, 1942), Cazier and Lacey (1952) and Zayas (1975) added *T. bicolor* Fisher, *T. nigripes* Fisher, *T. violaceipennis* Fisher, *T. vittatus* Fisher, *T. prasinus* Cazier and Lacey and *T. brevicornis* Zayas. Finally, Monné and Giesbert (1992) proposed *T. fisheri* as a replacement name for the junior secondary synonym *T. bicolor* Fisher (not Sallé).

These species were described and placed in the genus without regard to any morphological characteristics that hold all the species together. Most of these species were included based only on the orange and red/black or blue coloration pattern and the presence of a mesal-antennal spine on antennomeres 3 to 7. Although, *T. lineolatus*, *T. major*, and *T. vittatus* do not share the coloration pattern of the rest of the species, they do

have the mesal antennal spine. The mesal antennal spines are widespread in the Cerambycidae (Lingafelter, 1998) rendering the genus definitionless. Most species were described from one specimen or small series, and an assumption of endemism led to the description of populations collected on different islands. Also, descriptions were based on highly variable color characters or morphological structures that vary intraspecifically and between sex.

The only attempt at a synthetic treatment of the genus was that of Cazier and Lacey (1952), but this was limited to a key to species, which was largely taken from the literature and distribution. Therefore, at the start of the present study, *Trichrous* was placed in the Heteropsini with 17 species ranging through Cuba, Jamaica, The Bahamas, and Hispaniola (Monné and Giesbert, 1995). This assemblage was quickly seen to be highly polyphyletic, with the type species and 6 other names referring to members of the Elaphidiini, and the other 12 names belonging in the Heteropsini.

Lingafelter (1998) revised the Elaphidiini, using the presence of antennal carinae, tibial carinae, abruptly rounded anterior projection of the mesonotum, the mesal antennal spines, and a narrow metepisternum with a centrally positioned keel that is strong sclerotization below and membranous above, as synapomorphies for the Elaphidiini. These characteristics are exhibited by *T. irroratus*, the type species of the genus, and 6 other names. The remaining 12 names refer to species with characteristics of Heteropsini, although they belong to 3 different lineages. These species must therefore be removed from *Trichrous* s.s. Because the Neotropical genera of Heteropsini are currently under revision by Dra. Napp and her student (pers. com.), and redefining genera in that tribe is

beyond the scope of this study, the members of the Heteropsini previously placed in *Trichrous* are placed *insertae sedis* in the genus *Heterops* Blanchard (see Appendix A).

Of the 6 names that belong in the Elaphidiini, only 4 are congeneric with *Trichrous*, one of those a synonym. The other 3 represent 2 species of *Plectocerum* Dejean, and are treated in Chapter 6. These changes are summarized in Table 1.

Trichrous, as presented below, is highly modified taxonomically but represents a hypothetically monophyletic lineage closely related to *Nesiosphaerion* Martins and Napp (see Chapter 5). Now restricted to Hispaniola, it does not include any of the species studied by Darlington (1938) and Parson (1940) in relation to mimicry of the lycids genus *Thonalmus* Bourgeois, the sources of the color characteristics that seemed to best hold the genus together in the old sense.

Table 1: Checklist of all the species of *Trichrous* and the current status and placement

<i>Trichrous</i> name as recorded by Monné and Giesbert, 1995	Original Genus	Current placement
<i>Trichrous basalis</i> (White)	<i>Poeciloderma</i>	<i>Heterops basalis</i> (White)
<i>Trichrous bicolor</i> (Sallé)	<i>Mallosoma</i>	<i>Heterops bicolor</i> (Sallé)
<i>Trichrous brevicornis</i> Zayas		<i>Heterops brevicornis</i> (Zayas)
<i>Trichrous dimidiatipennis</i> Chevrolat	<i>Eriphus</i>	<i>Heterops dimidiatipennis</i> (Chevrolat)
<i>Trichrous divisus</i> Chevrolat		<i>Heterops divisus</i> (Chevrolat)
<i>Trichrous fisheri</i> Monné & Giesbert		<i>Trichrous jaegeri</i> Chevrolat
<i>Trichrous irroratus</i> (Olivier)	<i>Callidium</i>	<i>Trichrous irroratus</i> (Olivier)
<i>Trichrous jaegeri</i> Chevrolat		<i>Trichrous jaegeri</i> Chevrolat
<i>Trichrous jamaicensis</i> Chevrolat		<i>Trichrous basalis</i> (White)
<i>Trichrous lineolatus</i> (White)	<i>Poeciloderma</i>	<i>Plectocerum lineolatum</i> (White)
<i>Trichrous major</i> Gahan		<i>Heterops major</i> (Gahan)
<i>Trichrous nigripes</i> Fisher		<i>Trichrous nigripes</i> Fisher
<i>Trichrous pilipennis</i> Chevrolat		<i>Plectocerum pilipennis</i> (Chevrolat)
<i>Trichrous prasinus</i> Cazier and Lacey		<i>Heterops prasinus</i> (Cazier & Lacey)
<i>Trichrous terminalis</i> (White)	<i>Poeciloderma</i>	<i>Heterops terminalis</i> (White)
<i>Trichrous violaceipennis</i> Fisher		<i>Heterops violaceipennis</i> (Fisher)
<i>Trichrous vittatus</i> Fisher		<i>Heterops vittatus</i> (Fisher)

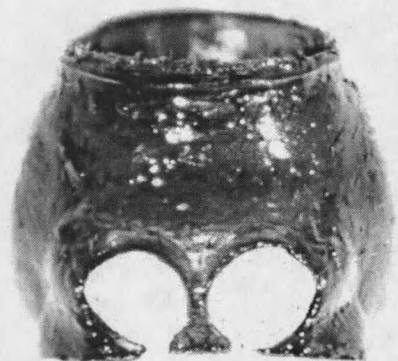
Trichrous Chevrolat

Trichrous Chevrolat, 1858: 210. Thomson, 1864: 203,431. Lacordaire, 1869: 126.

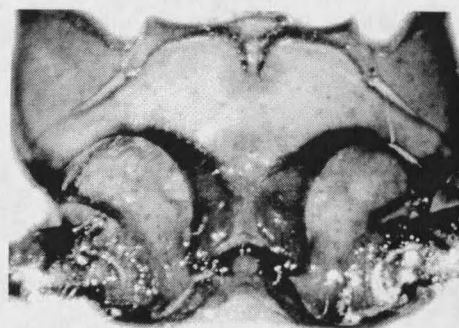
Cazier and Lacey, 1952: 40. Linsley, 1959: 130. Zayas, 1975: 147. Monné, 1994: 34. Monné and Giesbert, 1995: 134. Monné, Tavakilian, and Chevillotte, 2000.

Diagnosis. The genus *Trichrous* can be separated from the other genera of Elaphidiini by the following characteristics: integument scarcely setose ventrally; eyes coarse; pronotal disc and hypomeron joined at a distinct angle and very different in sculpture; disc somewhat flattened and subquadrate; punctuation alveolate or areolate, hypomeron sparsely punctate and setose; much sparser than pronotal disc; frontal punctuation areolate-rugose; antennal carinae present, antennal segments 3 to 7 spinose internally, 8 to 10 laterally acuminate; profemora clavate, femoral apices rounded; tibial carina present on at least mid and hind legs.

Description. Body form size moderate, elongate, sides subparallel; integument orange reddish-brown, yellowish-brown, or black. Head (Fig. 1A) short, inclined anteriorly, front broad, flat between the antennal tubercles, punctuation areolate-rugose, sparsely setose; mandibles short, terminal maxillary palpomeres moderately expanded; eyes large (Fig. 1A), coarsely faceted, emarginate, upper lobe embracing the antennal insertion; tubercles acute above socket. Antennae 11-segmented, usually slightly longer (male) or slight shorter (female) than the body; scape stout, coarsely punctate, clothed with scattered recumbent erect setae; segment 3 longer than 4; 4 shorter than 5 and 6;

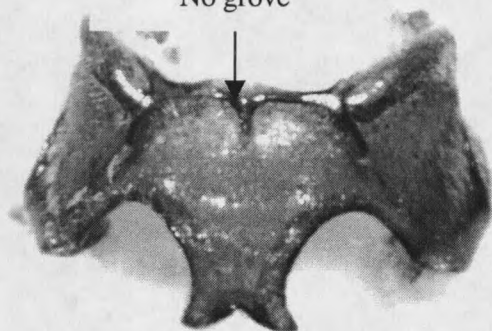


A

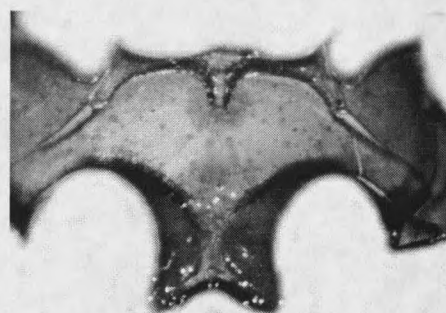


B

Median Projection
No groove

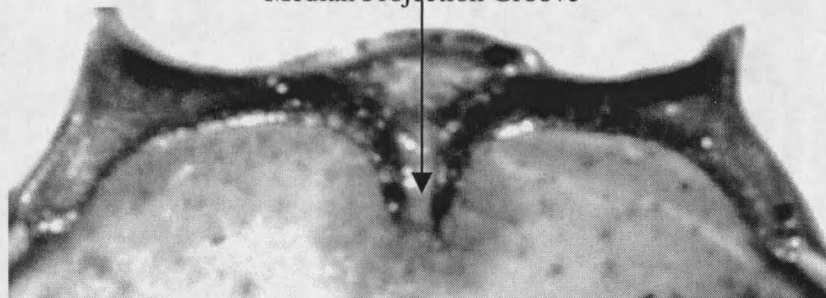


C



D

Median Projection Groove



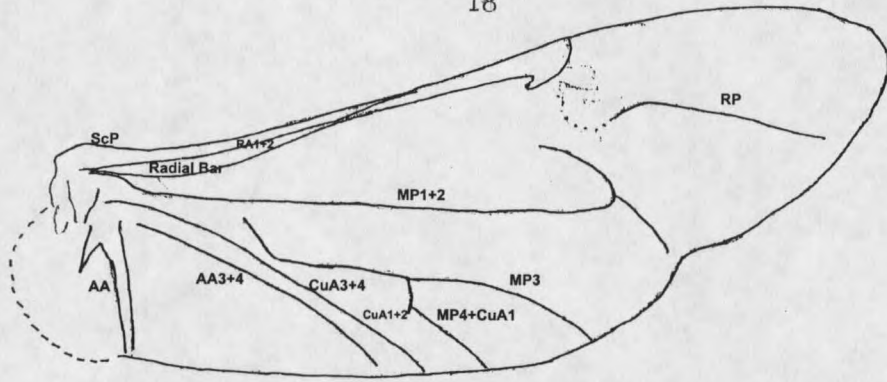
E

Figure 2: (A) Prosternum showing the prostenal process, *T. irroratus*; (B) Mesosternum showing the mesosternum process, *T. jaegeri*; (C) *T. irroratus* and (D) *T. jaegeri*, showing the median projection of mesosternum, and (E) groove of the median projection of mesosternum, *T. jaegeri*

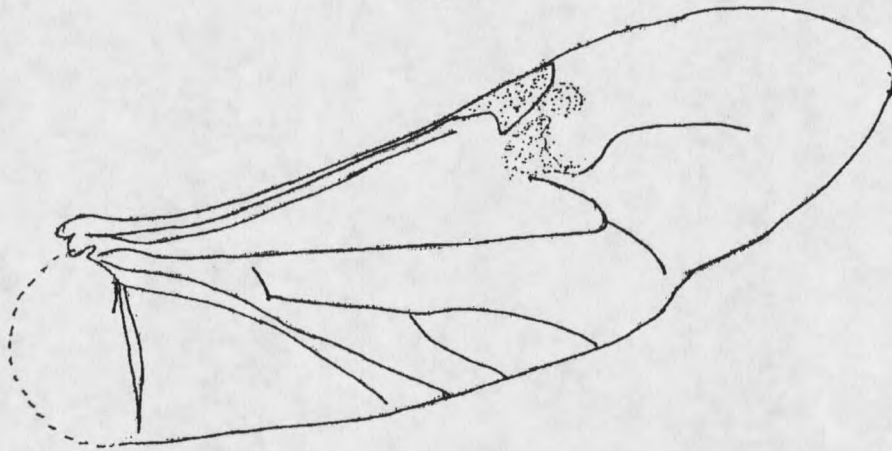
segments obviously to feebly carinate; 3 to 7 spinose at apex internally, 8 to 11 slightly acuminate, gradually wider at apex; most segments usually finely punctate, few long erect setae near apex of each segment. Pronotum slightly longer than wide, widest slightly behind middle, but narrower than the base of the elytra; disc well-differentiated, subquadrate, somewhat flattened, alveolate (Fig. 1C) or areolate (Fig. 1D), inconspicuous erect setae placed in both bottom of each puncture, pronotal disc and hypomeron joined at an angle ca. 90° , hypomeron usually impunctate or scarcely punctate (Fig. 1E).

Scutellum rounded at apex, usually setose. Prosternal projection (Fig. 2A) laterally expanded at apex. Mesosternal process (Fig. 2B-D) expanded laterally between the mesocoxae; latero-anterior margin of mesosternum abruptly directed posteriorly (Fig. 2D); medial projection of anterior margin of mesosternum produced posteriorly as a median projection (Fig. 2D). Metepisternum narrowed posteriorly, metasternal sulcus incomplete. Elytra coarsely punctate basally, more finely so at apex, erect setae present in punctures, humeral angles prominent, rounded; apex truncate, apicolateral spine usually short, acuminate or dentate. Legs with procoxae and mesocoxae globular, procoxal cavities closed laterally, open posteriorly. Femora finely punctate with fine erect setae, profemora moderately clavate, mesofemora feebly clavate, posterior femora less so. Tibiae nearly straight, tibial carinae present on all legs, most distinct on meso and metatibiae; protarsus shorter than meso- and metatarsi, tarsomere 1 longer than others.

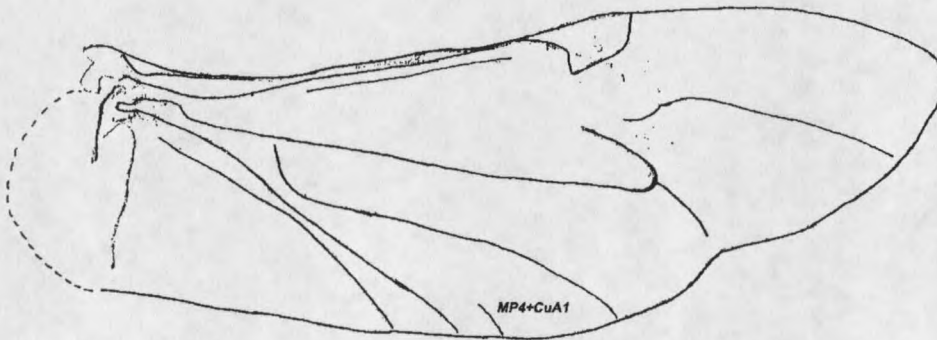
Abdomen, sparsely punctate and setose. Wings: Wing venation as in Fig. 3, vein RP present, MP_{1+2} bent apically towards base of the wing, MP_3 not touching vein MP_{1+2} , MP_4+CuA_1 usually present and fused to MP_3 ; CuA_{1+2} usually present but very short;



A

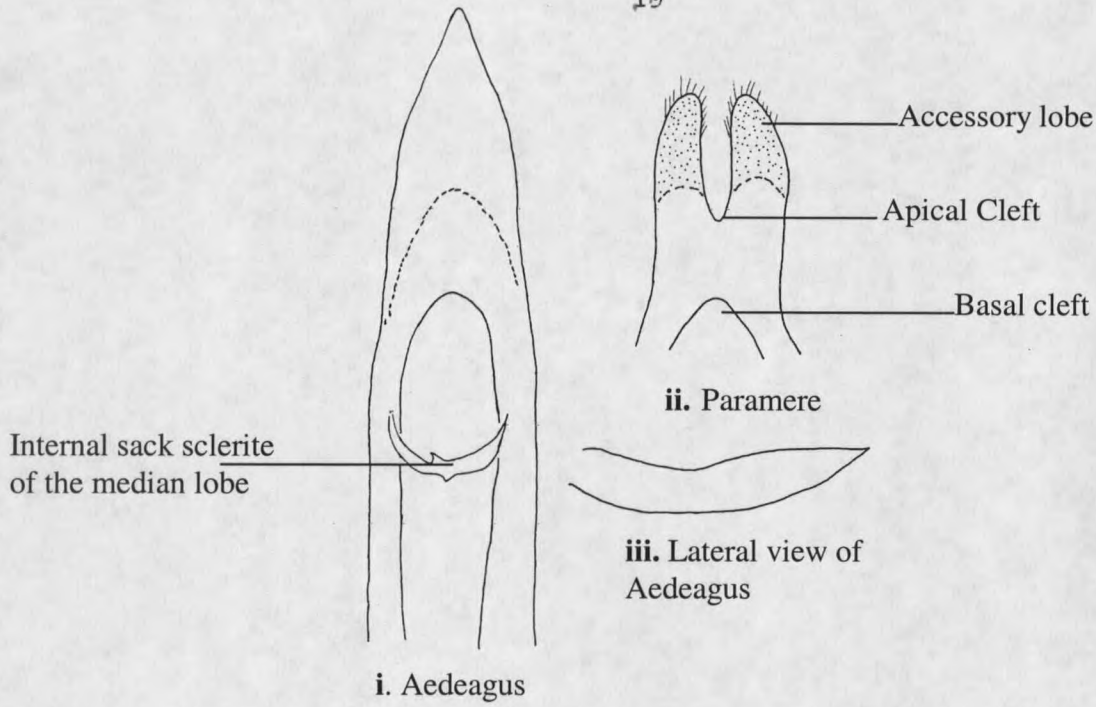


B



C

Figure 3: Hind wings (A) *T. jaegeri*, (B) *T. nigripes*, and (C) *T. irroratus*



A

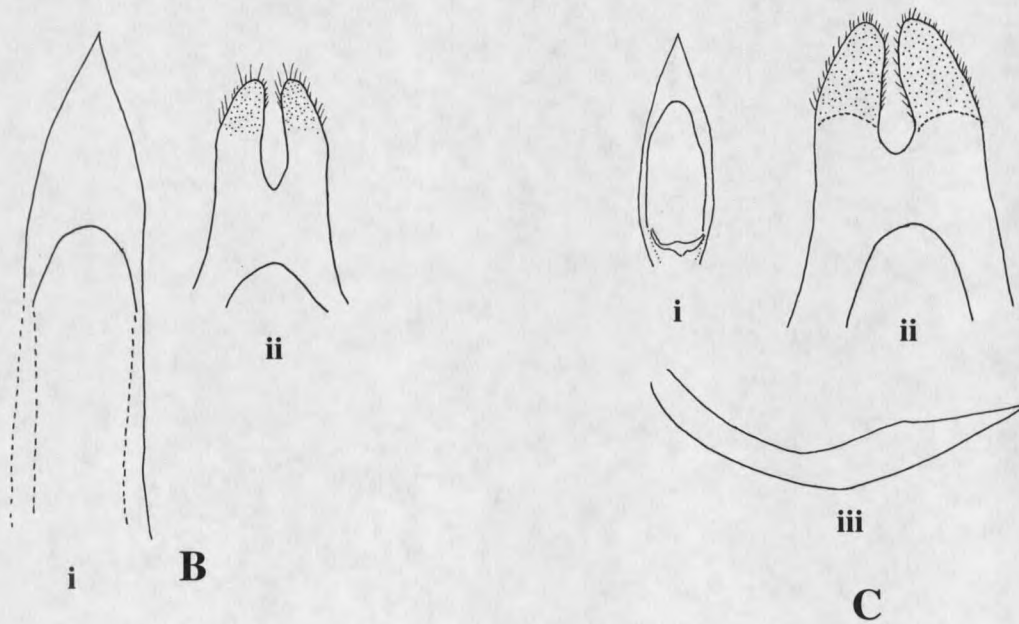


Figure 4: Male genitalia (A) *T. irroratus*, (B) *T. nigripes* and (C) *T. jaegeri*; i. aedeagus, ii. Paramere, iii. Lateral view of paramere

CuA₃₊₄ and AA₃₊₄ parallel, coming down to anal angle; AA₃₊₄ not starting at the wing base. Genitalia. General genitalic form as in Fig. 4 for all species. Apex of aedeagus acute to rounded; internal sack sclerite present; paramere apically with erect setae.

Distribution. *Trichrous* apparently is endemic to Hispaniola (Fig. 5)

Discussion. The new delimitation of the genus includes only 3 species, all endemic to Hispaniola.

Trichrous will key to couplet 78 in Lingafelter's key to Elaphidiini genera. That couplet distinguishes 2 related genera, *Nesiosphaerion* and *Nesanoplium*. The following should be substituted for his couplet 78.

78A. Alveolate-areolate sculpture of pronotum limited to disc, hypomeron impunctate to

simply punctate; disc flattened meeting hypomeron at an angle.....*Trichrous*

78A'. Alveolate-areolate sculpture of pronotal disc continued on hypomeron, disc and

hypomeron evenly rounded.....78B

78B. 10mm or less, Puerto Rico to Grenada.....*Nesanoplium*

78B'. 10 mm or more, Cayman Islands, Jamaica and Hispaniola.....*Nesiosphaerion*

The species of the genus *Trichrous* are variable in shape, size, and color. Descriptions should be carefully consulted in making determinations.

There is a clear differentiation between the males and females and of each species. The females are usually larger than males, with the antennae relatively shorter than in males. Moreover, the sexes of *Trichrous*, as in most Elaphidiini, can be separated by the shape of last antennomere (Ivie 1985). No larvae are known, and virtually nothing is known about the ecology and biology. Most specimens of *Trichrous* were collected



Figure 5: Map of Hispaniola showing the distribution of the *Trichrous* species

★ *T. irroratus*

✱ *T. nigripes*

✦ *T. jaegeri*

between May and July, which may suggest the months of greatest appearance or frequency. However, since this is based on the labels of the specimens, it may represent the period of greatest collector activity.

Key for identification of the Species of *Trichrous*

1. Pronotal punctuation areolate (Fig. 1D), disc subquadrate, hypomeron impunctate; median projection of mesosternum not grooved (Fig. 2C)2
- 1'. Pronotal punctuation alveolate (Fig. 1C), disc rounded, hypomeron punctate, median projection of mesosternum grooved (Fig. 2D)*T. jaegeri* (Fig. 6B)
2. Basal half of elytra red-brown and apical half black, or entirely black; with coarse white setae; legs usually red- brown.....*T. irroratus* (Fig. 6A)
- 2'. Elytra metallic blue, each elytron with a row of white setae along the elytral suture; legs black.....*T. nigripes* (Fig. 6C)

Trichrous irroratus (Olivier)

Callidium irroratum Olivier, 1795: 70. Schonherr, 1817: 459

Eriphus irroratus Dejean, 1833: 326. White, 1855: 294.

Trichrous irroratus Chevrolat, 1858: 210. Thomson, 1864: 203. Lacordaire, 1869: 127.

Gemmiger and Harold, 1872: 2956. Gahan, 1895: 117. Aurivillius, 1912: 442.

Leng and Mutchler, 1914: 447. Blackwelder, 1946: 586. Cazier and Lacey,

1952:40. Chemsak and Linsley, 1982: 48. Chemsak, Linsley, and Noguera, 1992:

77. Monné, 1994: 34. Monné and Giesbert, 1995: 134. Monné, Tavakilian, and Chevillotte, 2000.

Diagnosis. This species can be distinguished by the impunctate or scarcely punctate hypomeron in combination with the basally red-brown, apically black (or totally) elytra without metallic reflection, and the scattered patches of white setae on elytra. The form of the pronotum and hypomeron will distinguish it from similar-colored species of other genera.

Description. Male (Fig. 6A). Body form elongate, narrowed posteriorly. Head, prothorax, venter of meso- and metathorax, and femora red-orange; antennae, tibiae, tarsi and abdomen usually darker but variable red-orange to brown or infuscate red; apical portion of elytra black (see discussion of variation below). Head short, suboblique; front broad, alveolate-rugose; mandible short, stout; labrum transverse, shallowly emarginate medially, separated from clypeus by membranous band; eyes coarsely faceted, deeply emarginate, upper lobe embracing antennal insertion. Antennae 1-2 segments longer than body; segment 5 shorter than 3, carina very conspicuous on segment 3-6, clothed in both long erect and recumbent setae. Pronotum (Fig. 1D) longer than wide, subtrapezoidal, narrowed anteriorly, areolate punctate, usually sub-strigulate; disc slightly flattened; hypomeron from impunctate to scarcely punctate; disc and hypomeron, with long erect blond setae. Scutellum rounded behind, usually covered with coarse white setae. Prosternal process, slightly expanded apically; widest point of mesosternal process as wide as coxae cavities, medial projection of anterior margin of mesosternum not grooved (Fig. 2C); ventrites finely punctate, shining sparsely setose; laterally sparsely clothed

with coarse white setae. Legs. profemora clavate, meso- and metafemora feebly clavate, apex rounded, sparsely covered with erect setae; tibiae nearly straight. Elytron coarsely punctate, with long erect setae and patches of coarse white setae, apex truncate, with very short apicolateral tooth. Wing as in (Fig. 3C) vein MP4+CuA1 very short, and not connected to MP3; CuA₁₊₂ not present. Genitalia as in Fig. 4A, apex of aedeagus acute; aedeagus curved in lateral view (Fig. 4Aiii); lobes of parameres rounded, with long setae in 1/3; apical cleft rounded; basal cleft wide and rounded (Fig. 4Aii).

Female: The female and male are not very distinct morphologically. The shape of the last antennomere is the most obvious difference. Females are relatively larger than males, with the antennae subequal to the length of the body, and mandibles less curved than in males. The MP4 + CuA1 is connected to the MP3 in females.

Length: 7-14 mm

Distribution. *Trichrous irroratus* is known only from Hispaniola (Fig. 5). This species has been listed for Cuba (Chemsak, 1969; Monné and Giesbert, 1995), but examination of a photo of the single specimen in the Moravian Museum, Brno, Czech Republic shows it is a *Plectocerum pilipenne*. No other specimens of this species were seen from outside of Hispaniola.

Type material studied. Type is apparently lost (see discussion below)

Other material studied. 1- St. Dommique, D. Mannerheim (BMNH). DOMINICAN REPUBLIC: 1 f- San Pedro de Macoris, 13 Km E. Boca Chica, 14 May 1992, R. Turnbow; 1 f- Pedernales, 13 Km NE. Oviedo, 18 May 1992, R. Turnbow; 1 f- ibid., N. Cabo.Rojo, 19 May 1992; 1 f- Pedernales, 20.5 Km N. Cabo Rojo, 19 May 1992, R.

Turnbow; 1 f- Barahona, 4.5 Km S. Barahona, 17 May 1992, R. Turnbow; 7 f- ibid., 18 May 1992; 16 m- ibid.; 1 f- 19 May 1992; 7 m, 4 f- ibid., 22 May 1992; 14 m, 6 f- ibid., 23 May 1992; 1 f- Monte Cristi, 5 Km N. Villa Elisa, 26 May 1992, R. Turnbow; 2 m, f- 7 ibid., 31 May 1994; 2 m- ibid. 8.2 Km N. Villa Elisa; 2 m, 2 f- ibid., 4.8 Km 2 June 1994; 2 m, 3 f- ibid., 5 Km, 1 June 1994; 2 m, 9 f- ibid., 3 June 1994; (RHTC). 6 f- San Pedro de Macoris, Nr. Juan Dolio, v-4-1985, J.E. Wappes; 2 m- ibid.; 9 f- ibid., v-13-18, 1985; 3 m, 4 f- Barahona, 11 Km. S. Barahona, v-6-1985, J. E. Wappes; 2 m, 3 f- ibid. v-15, 17-1985; 1 f- Monte Cristi, 4-8 Km N. villa Elisa, v-10-1985, J.E. Wappes; 1 m- Puerto Plata, 14 Km N P. Plata, v- 11-1985, J. E. Wappes (JWPC). 4 m, 8 f- San Pedro de Macoris, May 5-19, 1985, E. Giesbert; 11 m, 16 f- 11 Km S. Barahona, May 5-19, 1985, E. Giesbert; 1 f- 5 Km N. Villa Elisa, May 10-18, 1985, E. Giesbert (EGPC). 1 f- Monte Cristi, 5-9 Km N. Villa Elisa, 26-v-1992, M.C. Thomas; 1 f- ibid., 4.8 Km N., 31-v-1994, [merc. Vapor/black light]; 1 f- 8 Km, N. Villa Elisa, 1 m, 1-f- ibid., 8 Km No. Villa Elisa; 5 m, 6 f- 5 Km N. Villa Elisa, 1-vi-1994, M.C. Thomas; 2 m, 2 f-ibid., 2.9 Km, 2-vi-1994; 1 f- ibid., 4.9 Km; 3 m, 2 f- ibid., 5 Km, 3-vi-1994; 1 m- Pedernales, 25.5 Km N. Cabo Rojo, 12-21-v-1992, M.C. Thomas; 1 m- 13 Km. E. Boca Chica, 14-v-1992, M.C. Thomas; (FSCA). 1 f- Monte Cristi, 5 Km. E. Playa Monte Cristi, 2-x-85, L.M. Stange; 1 f- San Jose de las Matas, [1,00-2,00 ft], Jun'38, Darlington; (MCZ). 1 m, 2 f- Jimani, La Florida 180 24' N. 71o 44' W [20 m moist site], 13 Apr 1993, M.A. Ivie, D. Sikes, & W. Lanier; 2 m- ibid., 14 Apr 1993; 1 m- ibid., [at UV light]; 1 f- Jimaní, CODETEL Office, 12 Apr 1992, [at light], , M.A. Ivie, D. Sikes, & W. Lanier; 1 f- Barahona, 5 Km NW Barahona, Ag. Fl. Srm, 29-30 Jun 1978, R.E. Woodruff & G.B. Fairchild [at black light

trap]; 1 m- La Romana, Higueral, 11-vi-76, R.E. Woodruff; (WIBF). 1 f- Boca Chica, Distrito Nacional, 3-vii-1977, Dominguez; 1 f- Las Tablas, Bani, Peravia, 16-vi-1979, Marcano; 3 m, 2 f- El Copey, Monte Cristi, 3-vi-1979, Marcano; 1 f- Juan Dolio, San Pedro de Macoris, 29-vi-1980, Dominguez; 1 f- Los Uveros, Boca de Yuma, La Altagracia, 1-v-1992, K. Guerrero & F. DelMonte; 2 m, 1 f- Barahona, 4.5 Km S. Barahona, 22 May 1992, R. Turbow; 2 m- Puerto Frances Viejo, Samaná, 12-iv-1979, Dominguez; 1- m El Morro, Monte Cristi, 8-xi- 1980, Marcano & Cicero; 1 m- Hatillo, Azua, 30-v-1981, Marcano & Cicero; 2 m- La Jaguita, Los Jobos, Las Matas de Farfan, San Juan, 24-v-1991, Marcano; (MNHD). 1 f- San Francisco, vi-24-1935, F. Phelar, [on wood with growing Orchid: 5269]; 1 f- Los Hidalgos, 4-5, vi-1969, Flint & Gomez; 1 f- Dajabon, 13 Km, S. Loma de Cabrera [ca 400m], 20-22 May 1973, Don & Mignon Davis; HAITI: 1 m- Nr. Port Beudet/ Plairies cul de sac; Apr 8:25, Hoffmann; 1 m- Pt. Prince, W. L. Rockwell; 1 m- acc, Port-au-Prince, Mar 28, 1930, H.L. Dozier; 1 f- ibid., Apr 5, 1930; 1 m- ibid., Marz 10, 31, H.L. Dozier [at lights 31-82], (NMNH).

Discussion. *Trichrous irroratus* was described by Olivier (1795) under the genus *Callidium*. Chevrolat (1858), moved this species to *Trichrous*. Thompson (1864) designated *Trichrous irroratus* as the species type of the genus.

Trichrous irroratus is a polymorphic species that can be separated into three forms based on the color pattern. The typical species form has the head, legs, scape, basal half of the elytra and ventral integument brown, the apical half of the elytra and the rest of the antennomeres are black. The black form has only the head and pronotum brown, with the legs, antennae, the elytra and the ventral integument being black. The brown-black form

is intermediate between the other two. Usually the individuals of this form have the head, pronotum, first pair of legs, the humeral area of the elytra brown; the ventral integument, mid and hind legs, antennae and the rest of the elytra black. In some individuals the first pair of legs and the scape can be black or brown, sometimes dark brown.

I found that this color variability does not correspond to geography. All three forms occur throughout the range, from Barahona in the South to Monte Cristi in the North. It seems that *T. irroratus* basically occurs in dry areas, since most specimens were collected from xeric forest areas of Hispaniola.

The type of this species is apparently lost. No one has reported seeing the type specimen of this species.

The Olivier collection of exotic beetles was passed to Chevrolat's collection in 1824, (Horn and Kahle, 1936). Chevrolat's Cerambycidae were sold to J.C. Beowing, who passed them to the British Museum in 1863. A specimen from the Chevrolat's collection in London labeled "*Trichrous; irroratus; Oliv.; St. Domingue/ Eriphus/irroratus Olivier; L. St. Dominique D. Mannerheim/ Bowr. Chev.; 63-47**" is not the type as it came from Mannerheim, not Olivier. The other four specimens in the BMNH are not from Chevrolat's collection, so are not identifiable candidates for the type specimen.

Article 75 (Neotypes) of the ICZN (1999), and its subsequent sections explain the conditions under which a Neotype should be designated. Article 75.3.1 restricts Neotype designation to situation that require a type to clarify the taxonomic situation. Although *T. irroratus* is highly variable, Olivier's (1795) color illustration has been adequate for over

200 years. No misidentifications have confused the literature, and no further problem is foreseen. Therefore, Neotype is not designated here.

Trichrous jaegeri Chevrolat

Trichrous jaegeri Chevrolat, 1858: 210. Lacordaire, 1869: 127. Gemmiger and Harold, 1872: 2956. Gahan, 1895: 117. Aurivillius, 1912: 442. Leng and Mutchler, 1914: 447. Blackwelder, 1946: 586. Cazier and Lacey, 1952: 40. Chemsak and Linsley, 1982: 48. Chemsak, Linsley, and Noguera, 1992: 77. Monné, 1994: 34. Monné and Giesbert, 1995: 134. Monné, Tavakilian, and Chevillotte, 2000.

Trichrous bicolor Fisher, 1932: 70 (not Sallé, 1856). Blackwelder, 1946: 586 (not Sallé, 1856). Cazier and Lacey 1952: 40 (not Sallé, 1856). Chemsak and Linsley, 1982: 48 (not Sallé, 1856). Chemsak, Linsley, and Noguera, 1992: 77 (not Sallé, 1856).

NEW SYNONYMY

Trichrous fisheri Monné & Giesbert, 1992: 251. Monné, 1994: 33. Monné & Giesbert, 1995: 134. Monné, Tavakilian, and Chevillotte, 2000. [replacement for *T. bicolor* Fisher, a junior secondary homonym.

Diagnosis. This species can be recognized by the combination of the basal half of the elytra orange-red, the apical half black, and the coarse, shallow punctures on the hypomeron. The form of the pronotum and hypomeron will separate it from similar-colored species of other genera.

Description. Male: Body form elongate, robust, broadest at the humeri; red-orange except for antennal segments 2-11, tibiae and tarsi dark, and apical half of elytra black. Head short, oblique, front broad, alveolate; eyes moderately faceted, lower lobe prominent, upper lobe embracing antennal insertion; labrum emarginate medially, joined to clypeus by a distinct membranous band, fronto-clypeal margin bisinuate; last maxillary palpalmeres moderately expanded. Antennae as long as body; scape finely punctate clothed with long erect and subdecumbent setae; segment 5 one-and-a-half times as long as 4; 5 and 6 subequal. Pronotum wider than long, disc convex, rounded laterally, alveolate (Fig. 1C), with long erect to decumbent setae; hypomeron moderately punctate and setose. Scutellum subtriangular clothed, with fine setae. Sternum. Mesosternal process flat between coxae, meso-metasternal notch narrowly rounded, subdeclivous before the coxae, medial projection of mesosternum grooved (Fig. 2D); mesepisternum and posterior-lateral corner of metasternum sometimes densely clothed with white setae; metasternum finely punctate, with short suberect setae; ventrites shining, scarcely setose. Legs. Femora subclavate, apices rounded; tibiae linear, gradually widened at apex, clothed with short erect setae, carina very distinct on meso- and metatibiae. Elytron with humeral angle prominent; densely punctate, at base punctures separated by ca 1 diameter, somewhat less dense toward apex; each puncture with long suberect seta; apex truncate, apicolateral tooth small. Wings as in (Fig. 3A); vein MP4+CuA1 present; CuA₁₊₂ present, but very short, anal veins reaching anal margin. Genitalia. Male genitalia as in (Fig. 4C); aedeagus relatively short and strongly curved in mid-section (Fig. 4Ciii), apex acute,

basal lobe short; paramere lobe short and broad, with short erect setae; apical cleft rounded; basal cleft broad-rounded.

Female (Fig. 6B) differs from male in being slightly stouter and having the antennae about as long as the body, or slightly shorter, as well as the last antennomere being shorter than males.

Length: 10-12 mm

Distribution. Recorded only from Hispaniola (Fig. 5).

Type material studied. *Trichrous jaegeri* Chevrolat LECTOTYPE male labeled: [red circle] Type/ Rev. Zoo.; 1858/ *Trichrous; jaegeri*; Chev.; St Domingo/ [green label, Chevrolat's Handwriting over someone else's; possible Mannerheim's"], *Callidium Eriphus; jaegeri* Chv.; *dimidiatipennis* Dej C3351; *spinicornne* 01. [illegible word]; L.S. Dominique D. Mannerheim/Bowr. Chev; 63.47*/6 [Lectotype: *Trichrous; jaegeri*; Chev; desig. M.A. Ivie, 2000. Specimen is intact except for left pretarsis (BMNH).

PARALECTOTYPE: female (BMNH): *Trichrous; jaegeri*; Chev.; St. Domingo [Chevrolat's hand writing]/ Rev. et Mg; 21818 p211/ Bowr. Chevr.; 63.47*/.

Paralectotype; *Trichrous; jaegeri*; Chevrolat; desig. M.A. Ivie, 2000.

Trichrous bicolor Fisher, HOLOTYPE female (NMNH) labeled: [red label] Type No.; 43747; U.S.N.M/ Port Au Prince; Haiti, 1899; R.J.Crew/ *Trichrous; bicolor*; Fisher.

Other materials studied. DOMINICAN REPUBLIC: 7 females- San José de las Matas [1.000-2000 ft], Jun'38, Darl. (NMNH); Monte Cristi, 4.8 km N. Villa Elisa, 2-vi-1994, Col. M.C. Thomas; 5km N. Villa Elisa, 2-vi-1994, Col. M.C. Thomas [merc. Vapor black light] (FSCA); Monte Cristi, 4.8 km No. Villa Elisa, mv=bl, 31-v-1994, R.

Turnbow; Monte Cristi, 5km N. Villa Elisa, 3-vi-1994, R. Turnbow (RHTC). 1m – [pink label] [Sto. Domingo] Pascoe, Coll. 93-60 [green label], 29006, ex. mus, Dejean, eac. Mus, Laferte; Antilles, S. Dom. Gv Fry coll. 1905.100 (BMNH); San José de las Matas [1.000-200 ft], June '38, Darl., 84, (MCZ); Haiti, Port-au-Prince, 27-1984, coll. M.C. Thomas [*Cassia* sp]; Monte Cristi 4.9 Km. N. Villa Elisa, 1-vi-1994, Coll. M.C. Thomas (FSCA); P. au Prince; Haiti, Tippmann, coll. 57, 213112 (NMNH); Monte Cristi; 4.8 km N. Villa; Elisa 2-vi-1994, R. Turnbow; Monte Cristi, 5 km N. Villa Elisa, 31-v-1994, R. Turnbow (RHTC).

Discussion. Described by Chevrolat in 1858, Fisher (1932) redescribed *T. jaegeri* as a new species under the name *T. jaegeri*. Fisher's name was secondary homonym of the name *Trichrous bicolor* Sallé. Monné and Giesbert (1992) replaced it with *Trichrous fisheri*.

Trichrous nigripes Fisher

Trichrous nigripes Fisher, 1942: 21. Blackwelder, 1946: 586. Cazier and Lacey, 1952: 40. Chemsak and Linsley, 1982: 48. Chemsak, Linsley and Noguera, 1992: 77. Monné, 1994: 34. Monné and Giesbert, 1995: 134. Monné, Tavakilian, and Chevillotte, 2000.

Diagnosis. The metallic blue elytra will immediately distinguish this species from the other *Trichrous*. The alveolate pronotal disc with nearly impunctate hypomeron will distinguish it from other West Indian cerambycids with blue elytra.

Description. Male: Body form elongate, slender, subparallel, head, pronotum, and venter orange-red; antennae and legs black. Head short, front oblique, punctate areolate-rugose, usually substrigulate; labrum transverse separated from clypeus by a membranous band, eyes moderately faceted deeply emarginate upper lobe embracing the antennal insertion; mandible short stout. Antennae as long as the body clothed in both erect and recumbent setae. Pronotum subtrapezoidal, narrowed anteriorly, broadest at middle, disc flat; hypomeron (Fig. 1E) usually impunctate, scarcely setose. Scutellum rounded behind, clothed in silky pubescence. Mesosternum flat between coxae; subdeclivous in front of the mesocoxae; meso-metasternal notch narrowly rounded, median projection of mesosternum not grooved; metasternum and ventrites finely punctate with fine erect setae. Legs profemora clavate meso- and metafemora feebly clavate; tibiae straight, carina present. Elytra densely punctate, punctation separated by half diameter of puncture, each puncture with suberect setae; humeral angle prominent; each elytron usually with a row of coarse white setae on second interval; apicolateral spine of the elytra short but acute. Wings as in Fig. 3B. Genitalia (Fig. 4B) very similar to *T. irroratus*, internal sack sclerite of median lobe present.

Females (Fig. 6C) are slightly larger than males, and the last antennomere is shorter than in the male.

Length: 7-10 mm

Distribution. Recorded only from the central and southern Dominican Republic (Fig. 5).

Type material studied: *Trichrous nigripes* Fisher, HOLOTYPE female (MZC) labeled: fthills Cord. Cent.; S. of Santiago; June '38. Dom. Rep.; Darlington./ Type No.; *Trichrous; nigripes*; Fisher/ M.C.Z.; Type; 23769/ *Trichrous; nigripes*; Fisher.

Other material studied. DOMINICAN REPUBLIC: 1 m— Los Densamparados, Haina, San Cristobal, 4-iv-1982, Col. H. Dominguez; 1 m— Km 25 carr. Alcoa, Pedernales, 20-v-1992, Col. Guerrero & DelMonte (MNHD); 5 f — Pedernales, 25.5 km N. Cabo Rojo, 20-v-1992, R. Turnbow; La Vega, 1.4-2.6 km E. Manabao, 5-vi-1994, Turnbow; La Vega 8 km E. Manabao, 6-vi-1994, R. Turnbow; La Vega, vic. La Cienega, 18-vii-1996, R. Turnbow (RHTC); Barahona, 18 km Cabral, Polo Rd. 1.5 km S.E. Montear Nuevo; 18° 06.452' N., 71° 14.717' W, 26-vii-1999 [1020m] M.A. Ivie & K.A. Guerrero (WIBF).

Discussion. This species seems to be very rare and occurs sporadically in the central and southern part of the Dominican Republic. This species resembles the black form of *T. irroratus*, but differs being distinctly metallic blue.

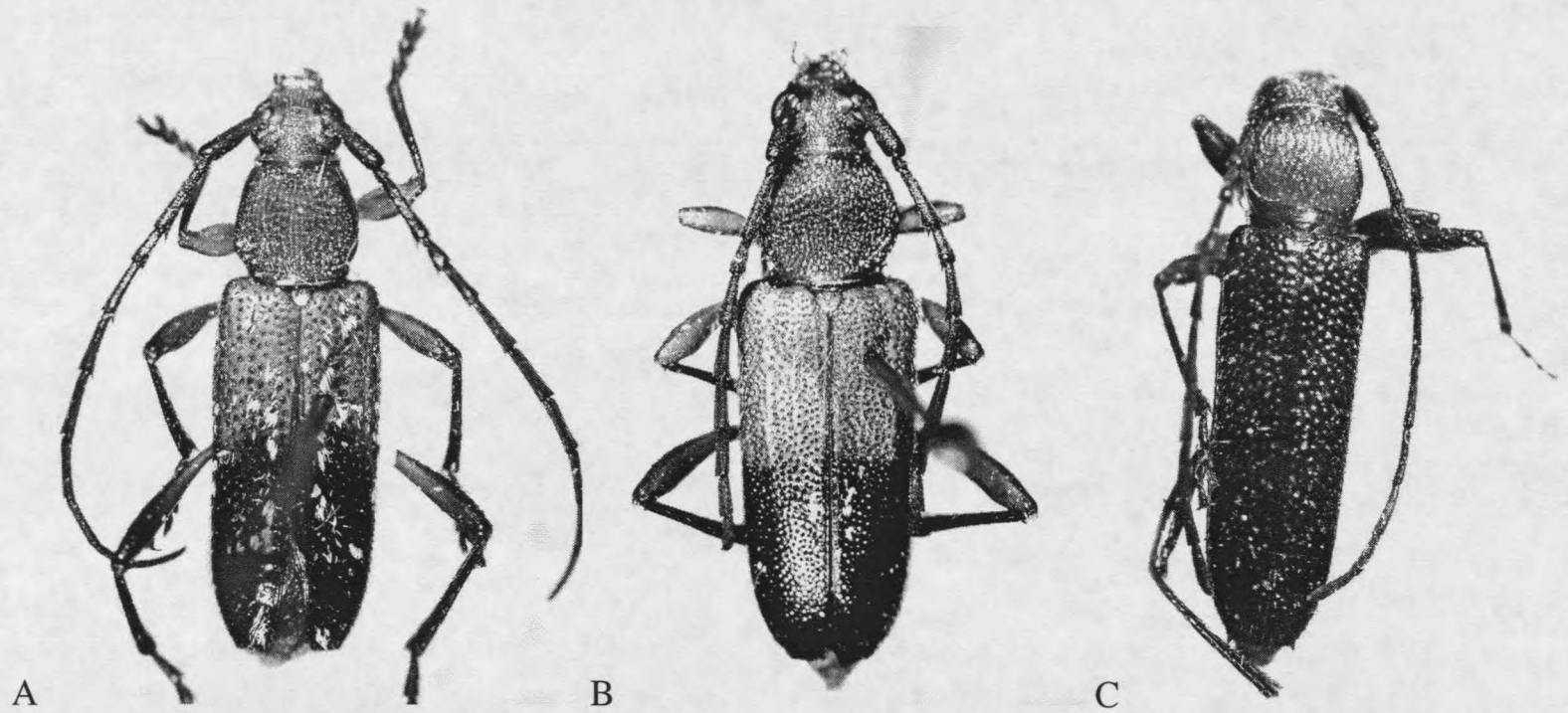


Figure 6: (A) *T. irroratus*, (B) *T. jaegeri*, and (C) *T. nigripes*

CHAPTER 5

PHYLOGENETIC ANALYSIS OF THE GENUS *TRICHOUS* CHEVROLAT

A cladistic analysis was done to obtain an hypothesis of relationship between the three species of the genus *Trichous*. The closely related genus *Nesiosphaerion* Martins and Napp, 1982, and more distinctly related genus *Curtomerus* Stephens, 1839 were used as outgroups. These genera were represented by the species *Nesiosphaerion fasciatum* (Fisher) NEW COMBINATION and *Curtomerus flavus* (Fabricius). Ten characters exhibiting 23 states were used to conduct the analysis and construct the cladogram.

Characters, states and definitions are as follows:

Character 1. - Pronotal punctation. The definitions of the character states follows Harris (1979), which is stricter than the rather loose application of these terms by some cerambycid workers.

- (0) Puncticulate, sparsely punctate with very fine, widely spaced punctures;
- (1) Alveolate (Fig. 1C), refers to a honeycombed pattern with regular, deep, flat-bottomed cavities (alveolae) separated by thin partitions, in this case with flat tops.
- (2) Areolate-substrigulate (Fig. 1D). Divided into a number of irregular, flat-bottomed spaces which have a tendency to become elongate and subparallel, separated by thin partitions, in this case with acute tops.

This character was ordered using the Wagner parsimony because state 2 requires state 1 as an intermediate step from state 0 as well as for the characters 3 and 5.

Character 2. - Pronotal disc shape.

(0) Sub-quadrate (Figs. 6A, 6 C);

(1) Rounded (Fig. 6B).

Character 3. - Hypomeron punctation.

(0) Impunctate or scarcely punctate; punctures separated by 1 or more diameters at densest point on a line between eye and humerus (Fig. 1E);

(1) Sparsely punctate; punctation coarse, separated by about 1 diameter at densest point on in a line between eye and humerus;

(2) Densely punctate, punctation confluent. separated by about 1 diameter at densest point on in a line between eye and humerus;

Wagner parsimony was used because state 2 requires state 1 as an intermediate step from state 0.

Character 4. - Separation of hypomeron from disc.

(0) Disc not divided from hypomeron;

(1) Disc distinctly divided from hypomeron (Fig. 1E).

This character is sometimes hard to visualize. In State 0, the disc is evenly convex across broadest portion in frontal view, and continues into the hypomeron without a break in the curve. This state correlates with the hypomeral punctation equal to, or even stronger than, that of the disc. In State 1, the disc is more flattened, so that there is a distinct change in pitch where it merges with the hypomeron. This state only occurs when the punctation of the disc is confluent, and the punctation of the hypomeron is sharply less dense.

Character 5. - Median projection of mesosternum.

- (0) Absent;
- (1) Present and longitudinally grooved medially (Fig. 2D);
- (2) Present but not grooved (Fig. 2C).

The median projection is a posterior extension of the post procoxal ridges at their median end. These ridges are confined to the areas behind the procoxae in state 0; where not median projection is present. The grooved condition of the median projection (1) is the result of these ridges being separate. The not grooved condition (2) is a further development, with the median-posterior arms of the ridges fused. Wagner parsimony is invoked because state 2 requires state 1 as an intermediate step from state 0.

Character 6. - Coarse white scale-like setae

- (0) Absent;
- (1) Present.

Character 7. - Aedeagus shape in lateral view:

- (0) Aedeagus strongly curved (Fig. 4Ciii);
- (1) Moderately curved (Fig. 4Aiii).

Character 8. - Shape of apex of aedeagus:

- (0) Rounded;
- (1) Acute (Fig. 4Ci).

Character 9. - Hind wing vein MP_4+CuA_1 :

- (0) MP_4+CuA_1 joined to the vein MP_3 (Fig.3A, 3B);
- (1) MP_4+CuA_1 separate, not reaching MP_3 (Fig. 3C).

Character 10. - Hind wing vein CuA1+2:

- (0) CuA1+2 present and short (Fig. 3A);
- (1) CuA1+2 absent, (Fig. 3B-C).

The character matrix is shown in Table 2.

Table 2. Character State Matrix of *Trichrous* and Outgroups

Taxon	Character									
	1	2	3	4	5	6	7	8	9	10
<i>Curtomerus flavus</i>	0	1	2	0	0	0	1	0	0	0
<i>Nesiosphaerion fasciatum</i>	1	1	2	0	1	1	0	1	0	1
<i>T. irroratus</i>	2	0	0	1	2	1	1	1	1	1
<i>T. jaegeri</i>	1	1	1	1	1	1	0	1	0	0
<i>T. nigripes</i>	2	0	0	1	2	1	1	1	0	1

Characters numbers 1, 3, and 5 were ordered using Wagner parsimony for the reason explained on each characters, whereas the rest of the characters were treated as unordered, using Fitch parsimony (Wiley, 1981; Wiley et. al 1991; Madison, and Madison, 2000; and Lipscomb 1998). To search for the most parsimonious trees, the Exhaustive option of PAUP was used. Because this was feasible, I only had five taxa and ten characters.

Results: Fifteen trees were discovered with the exhaustive search of PAUP, with a single shortest tree discovered (Fig. 7), requiring 15 steps, with a Consistency Index (CI) of 0.87, Retention Index (RI) of 0.75, and Rescaled Consistency Index (RC) of 0.65. The tree was rooted and the characters traced in MacClade® 4.0.

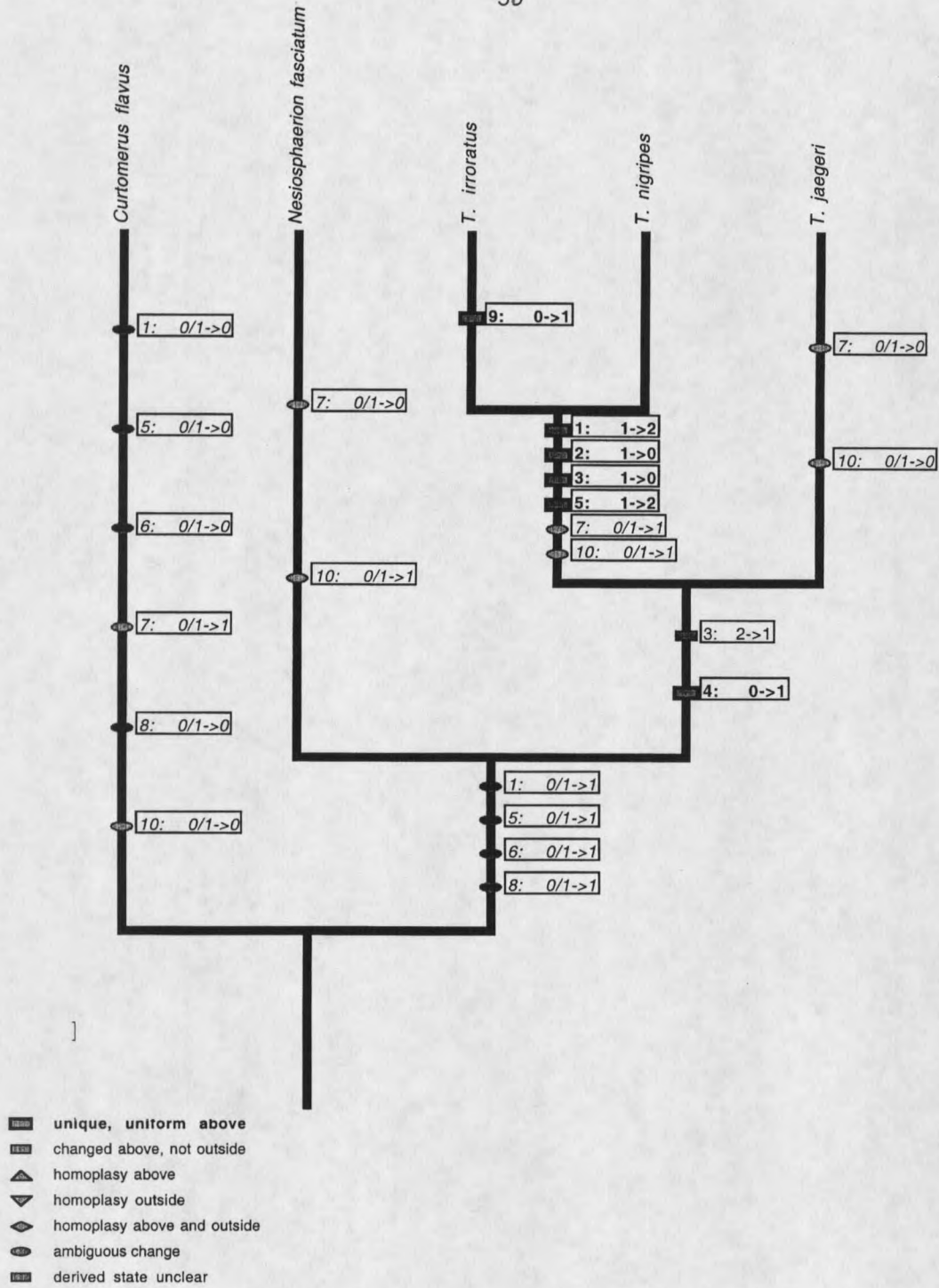


Figure 7: Cladogram showing the relationship hypothesis and monophyly of *Trichous*

Discussion: The purpose of this analysis was limited to studying the relationships of the species of *Trichrous*. The results clearly support the sister-group relationship of *T. irroratus* and *T. nigripes*, based on 4 unambiguous synapomorphic character states of the pronotum, hypomerion, and mesosternum. *Trichrous jaegeri* is then placed as the sister of those 2 together by the characters that support the monophyly of the genus.

All three species of *Trichrous* occur in overlapping ranges on Hispaniola. As such, no biogeographic information can be teased from the phylogenetic hypothesis. However, as part of the red/orange-black/blue group of Greater Antillean arthropods purported to form a mimicry ring (Darlington 1938, Parsons 1940), this phylogenetic hypothesis may eventually be added to others to provide insight into the evolution of convergence driven by apparent mimicry.

In the shortest cladogram, the monophyly of *Trichrous* is supported by the form and unique punctuation of the prothorax (characters 3 and 4). A sister-group relationship with *Nesiosphaerion* is shown in this cladogram, but this can only be interpreted as weakly supported because of the few out-group taxa included, and because all 4 characters supporting the relationship (1,5,6,8) could be polarized in an equally parsimonious manner as autapomorphies for *Curtomerus*. It is important to remember that these genera were included as functional out-groups for polarization purposes, not specifically to test a sister-group relationship.

However, informal evaluations of polarization for these characters supports a *Nesiosphaerion/Trichrous* relationship. Character states 1(1) and 1(2) [Lingafelter's

(1998) character states 22 (3) and a small subset of 22 (2) because of redefinition] are present in only a few genera of elaphidiines, including not only *Nesiosphaerion* and *Trichrous*, but also the West Indian genus *Nesanoplium*. Lingafelter included detailed characters of the anterior margin of the mesosternum in his study (his character 31, 6 states), but reported nothing like the grooved median projection [character state 5(1)] that *Nesiosphaerion*, *Trichrous* and *Nesanoplium* share, while state 5(0) seen in *Curtomerus* is widespread inside and outside the tribe. Character state 5(2) corresponds to Lingafelter's 31(6), which he reported from a restricted set of North American taxa, but that group exhibits a very different mesosternal notch, indicating there may be homoplasy involved.

Nesiosphaerion is a rarely collected genus, currently with three Greater Antillean species (Monné and Giesbert 1995) plus one added here. We have seen other species that need description or transfer to this genus. A revision of *Nesiosphaerion* is desperately needed, and such a project should examine all species of the very similar *Nesanoplium*, as well as *Trichrous* among the out groups. It is possible that such a study will show that *Nesiosphaerion* and *Nesanoplium* are synonymous, and that *Trichrous* is a specialized lineage thereof, but determining this is beyond the scope of this study.

CHAPTER 6

REVIEW OF THE GENUS *PLECTOCERUM*

Plectocerum was described by Dejean in 1835 for the Hispaniolan type species (by monotypy) *Callidium spinicorne* Olivier. In the only subsequent nomenclatural act within the genus, Sallé (1856) added *P. cribratum*, also from Hispaniola. Lacordaire (1869) placed the genus in the Heteropsini, where it has remained without comment. Since that time, the genus has languished solely in checklists (Monné and Giesbert 1995, etc.), and it remained a poorly understood group until a revision of *Trichrous* Chevrolat (Chapter 4) called its membership into question. This is in most part a result of the general taxonomic confusion surrounding the lycid-like cerambycids of the West Indies. This is discussed further in the Chapter on *Trichrous*.

The problem came to light when material of *Plectocerum* was found mixed with *Trichrous* specimens received during a revision of that genus. Examination of the two species showed not only that they were synonyms, but that they, like *Trichrous sensu stricto*, possess the synapomorphies of the Elaphidiini (Lingafelter 1998). Further, it was clear that some species currently placed in *Trichrous* were closer to *Plectocerum*.

Based on the work of Lingafelter (1998), and our revision of *Trichrous*, we redescribe *Plectocerum*, move it to the Elaphidiini, add two species from *Trichrous*, synonymize Olivier's and Sallé's species, and redescribe and key the three recognized

species. This work is titled a review, because it is not intended to represent a true revision – a project that will require work far beyond the scope of our current projects. I hope this will allow curators to identify material of this unique, poorly known, and rarely collected group to make it available for a full revision in the future.

Plectocerum Dejean

Plectocerum Dejean, 1835: 330. Lacordaire, 1869: 135. Monné & Martins, 1981: 186.

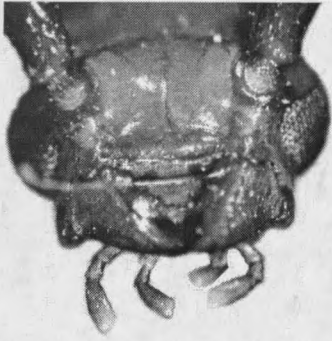
Monné, 1994: 36, Monné & Giesbert 1995: 133. Monné, Tavakilian, & Chevillotte, 2000.

Diagnosis. The antennal carina, mesal antennal spine, and tibial carina places the genus in the Elaphidiini (Lingafelter 1998). *Plectocerum* is difficult to diagnose without relying on geography and color pattern. As such, its monophyly is in question, and remains an important reason for a full revision. The shining red/orange subcylindrical pronotum with long flying hairs and the disc ranging from impunctate to a few scattered large, shallow, flat-bottomed punctures, in combination with red/orange and black-to-metallic-blue/purple elytra or solid black elytra with a longitudinal stripe of white setae will distinguish this genus from all other West Indian Elaphidiini, and all other Elaphidiini I am familiar with. See the Discussion (below) for more information on distinguishing this genus from other Elaphidiini.

Description. Body form medium size, elongate, parallel sided, moderately flattened dorsally. Integument color red to brown-yellowish, elytral black with iridescent

metallic blue. Head short inclined (Fig. 8A,D); eyes moderate-sized, coarsely faceted, upper lobe narrow, embracing the antennal insertion from behind; mandible short; clypeus and labrum fused, not heavily sclerotized; last maxillary palpolmere elongate, moderate expanded; front broad, subvertical, usually oblique, impunctate or sparsely punctate. Antenna usually as long or longer than body, 11-segmented; tubercles prominent; segments gradually widened at apex, finely punctate, segment 4 very small, segment 3, 5, 6, and 7 subequal, fringed with long erect setae, carina generally present on segments 3-7, mesal antennal spine present on segments 3 to 7. Prothorax subcylindrical; pronotum shining with or without smooth calli; variably, never densely, punctate; with erect flying hairs; hypomeron generally finely punctate, continuously curved. Scutellum rounded. Prosternal process expanded apically between coxae; mesosternum usually as wide as coxae cavities, expanded between the mesocoxae; metasternal sulcus incomplete; metepisternum not highly sclerotized. Elytra finely to coarsely punctate, with long erect flying hairs, apex truncate rounded or externally dentate. Ventral integument shining finely punctate with sparse setae, ventrite I, 1.5 X longer than II. Legs. Pro- and mesocoxae globular; procoxal cavities closed laterally and open posteriorly; profemora clavate, shining, finely or transversely punctate, apex generally rounded; tibiae straight, carina present, erect and recumbent setae. Wings as in Fig. 9A, The male genitalia (Fig. 10B-C) with paramere lobes short (Fig. 9Bii, and 9Cii), with short erect setae along the apex. The apical and basal clefts are rounded.

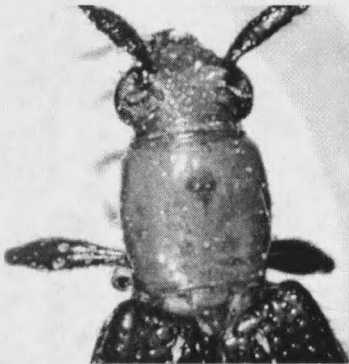
Female, usually larger than males, antennae shorter, last abdominal sternite usually wider.



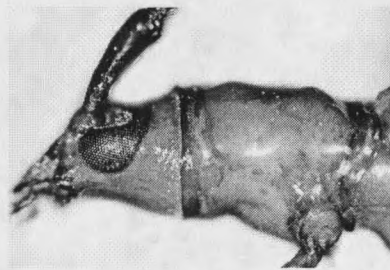
A



B

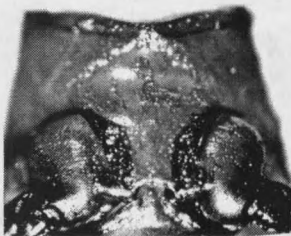


C



D

Median
projection
absent

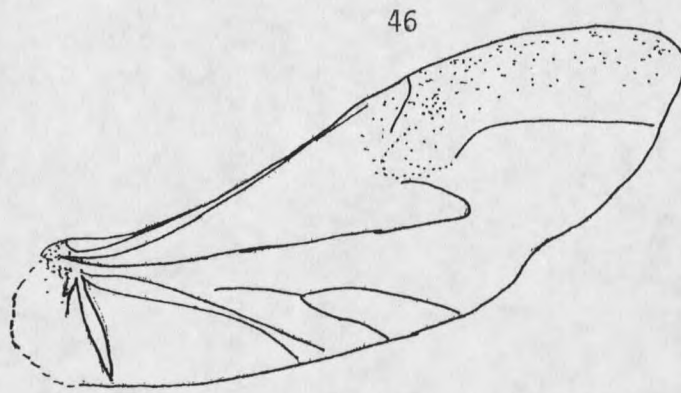


E

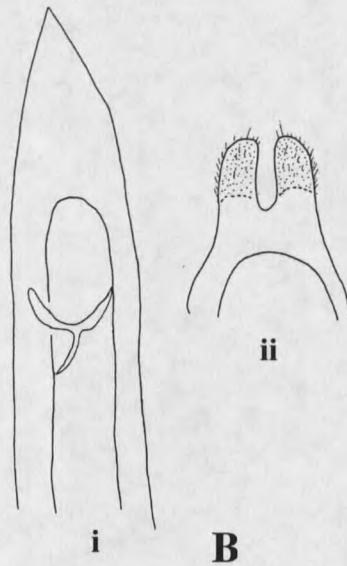


F

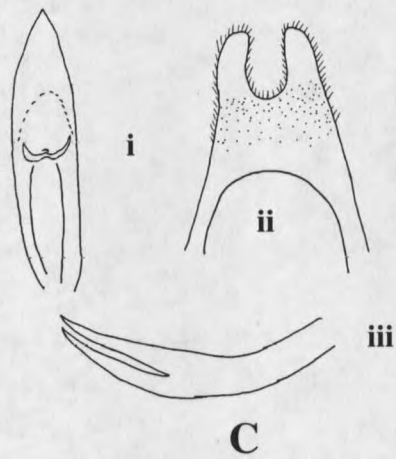
Figure 8: (A) Frontal view head (*P. spinicorne*); (B) Prothorax (*P. lineolatum*); (C) Dorsal view pronotum and head (*P. lineolatum*); (D) Lateral view head and prothorax (*P. spinicorne*); (E and F) Mesosternum *P. spinicorne*.



A



B



C

Figure 9: (A) Hind Wing of *P. pilipenne*, (B) Genitalia of *P. spinicorne*, (C) Genitalia of *P. pilipenne*; i. aedeagus, ii. Paramere, iii. Lateral view of paramere.

Distribution: Cuba, Bahamas, Jamaica and Hispaniola.

Discussion. Incorporating *Plectocerum* into the generic key given by Lingafelter (1998) is difficult. The problem begins at the first couplet, because the eyes of *Plectocerum* species are variable, and can follow either choice imperfectly (eyes large and coarsely faceted, nocturnal vs. eyes small and finely faceted, diurnal). The eyes of this group seem to indicate a move from a nocturnal ancestor to a current diurnal condition, perhaps driven by, or as a result of, the mimicry exhibited by the included species (Darlington 1938, Parsons 1940). As such, it is interesting that the eye facets and size of the lower lobe decrease in size as the resemblance to the purported model (*Thonalmus* Bourgeois) increases. The least *Thonalmus*-like species, *P. lineolatum*, has the largest eye facets, followed by *P. pilipenne*, and the most highly similar *P. spinicorne*. The only species where this mimetic relationship has been studied, *P. pilipennis*, is recorded to be diurnal (Darlington 1938, Parsons 1940), a characteristic shared at least with *P. spinicorne* (M.A. Ivie, pers. obser.). As far as I know, *P. lineolatum* has not been seen alive for over 150 years, and there are no data on nocturnal vs diurnal habits, however it looks more like a cantharid or lampyrid than a *Thonalmus*, and judging from the eyes, might be crepuscular or even nocturnal.

This situation allows the species of *Plectocerum* could to go either way at couplet 1 of Lingafelter's key. In *P. spinicorne*, the eyes are smaller, and the facets finer than in the other two. The lower lobe of the eye is separated from the dorso-lateral articulation of the mandible by the width of the three antennomere. It would therefore best fit 1', and then imperfectly key to the Mesoamerican *Sphaerionillum* Bates, but will not match the

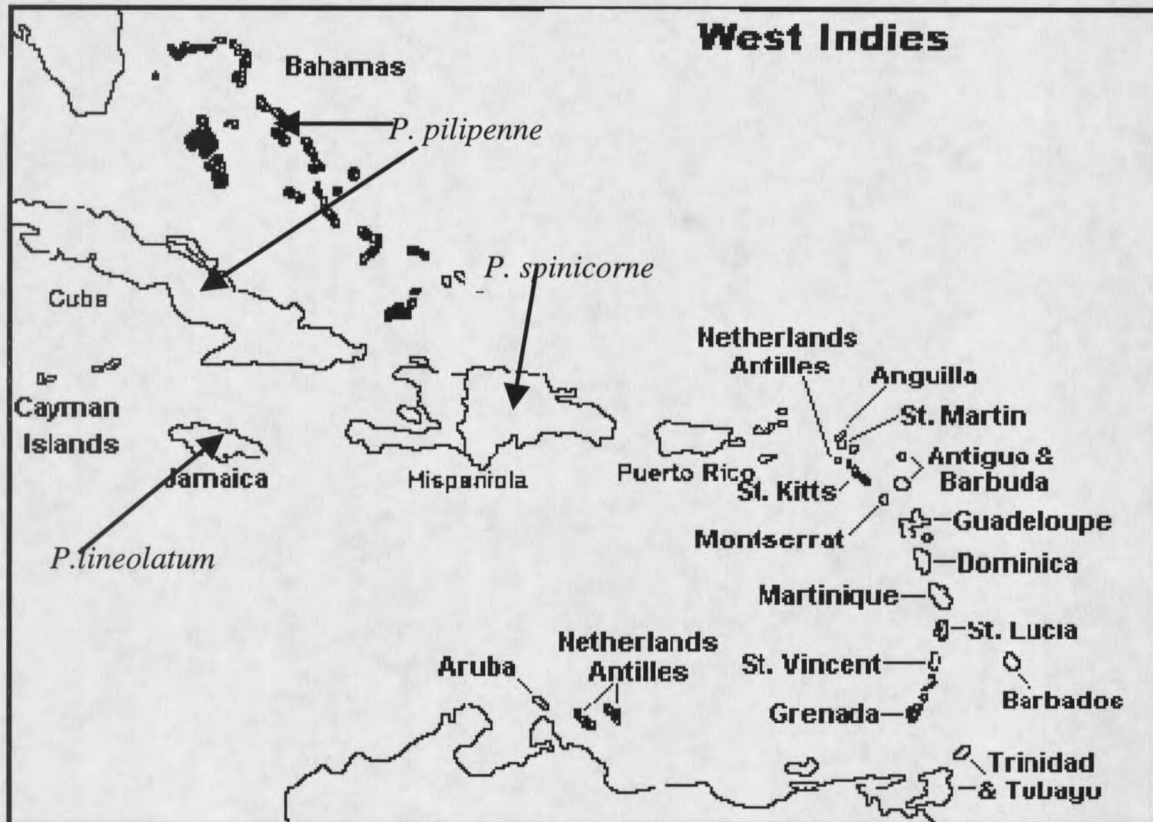


Figure 10: Map of the West Indies showing the distribution of the species of *Plectocerum*

color pattern. It further differs from that genus by a lack of a medium callus on the pronotum.

In the other species, the lower lobe of the eye reaches the dorso-lateral articulation of the mandible, but the facets are still somewhat finer than in the *Elaphidion*-types.

Although at least *P. pilipenne* is known to be diurnal (Darlington 1938, Parsons 1940), they would seem to go with #1 to couplet 2.

From there, *P. lineolatum* will key to couplet 76, where it will fit neither choice. The lack of pronotal calli and the color of the elytra will set it apart at that point.

On the other hand, *P. pilipenne* keys to the monotypic Brazilian genus *Neomallocera* Martins and Napp, because of the reduced apico-lateral spine of the elytra. It can be quickly distinguished from that genus by a lack of dense metallic pubescence on the elytra, and the rounded apices of the mesofemur.

Overall, this problem of characterization is a microcosm of the common situation where character states diverge in a given lineage through clearly selective pressure to conform to a mimetic model. Use of such character states subject to such intra-lineage divergence/extra-lineage convergence in phylogenetic studies, such as Lingafelter's (1998) will always make clear monophyletic characterization of mimetic groups difficult, and often lead to the polyphyletic groups seen in the existing classification of West Indian lycid-like cerambycids. Although I hope to have helped the situation in the elaphidiine members of this mimetic assemblage, I have left behind an equally bad situation in the Heteropsini.

Keys for Identification of the Species of *Plectocerum*

1. Pronotum evenly rounded to nearly cylindrical, without trace of calli; antennae as long as the body; elytra obviously punctate; femora not clavate, apex rounded....2
- 1'. Pronotum widened posteriorly, with indistinct lateral discal calli; antennae longer than the body; elytra impunctate except for insertions of scattered flying hairs; femora clavate, apex dentiform.....*P. spinicorne* (Olivier)
2. Pronotum sparsely, shallowly punctate; elytra black with longitudinal row of coarse white setae on third interval.....*P. lineolatum* (White)
- 2'. Pronotum impunctate, elytral basal half red to yellowish brown, apical half black, without coarse white setae.....*P. pilipenne* (Sallé)

Plectocerum lineolatum (White) New Combination

Poeciloderma lineolatum White, 1853: 122. Gemminger and Harold, 1872: 2958.

Waterhouse, 1874: 29.

Trichrous lineolatus: Gahan, 1895: 117. Aurivillius, 1912: 442. Leng and Mutchler, 1914: 447. Gowdey, 1926: 21. Blackwelder, 1946: 586. Cazier and Lacey, 1952: 40. Chemsak and Linsley, 1982: 48. Chemsak, Linsley, and Noguera, 1992: 77. Monné, 1994: 34. Monné and Giesbert, 1995: 134. Monné, Tavakilian, and Chevillotte, 2000.

Eriphus leucogrammus White, 1855: 295. Gemminger and Harold, 1872: 2958

Trichrous leucogrammus White 1855: 294.

Diagnosis. The nearly cylindrical orange-red pronotum with a few scattered large, shallow, flat-bottomed punctures on the disc and the black, coarsely punctate elytra, with a row of white coarse setae along the third elytral interval will clearly distinguish this species from other West Indian elaphidiines.

Description. Male (Fig. 11B): Body elongate, subparallel; head, prothorax and venter orange-red; antennae and legs, black-brown, elytra black with faint metallic blue-purple reflections and a white stripe on second elytral interval. Head inclined; front broad, coarsely densely punctate; mandible short, acute; labrum emarginate, joined to the clypeus by membranous band; last maxillary palpolmere moderately expanded; eyes coarsely faceted, deeply emarginate, upper lobe embracing the antennal insertion.

Antennae as long as the body, clothed in both long erect and recumbent setae; scape 5X length of the pedicel; antennal carina absent, mesal antennal spine acuminate, present on segments 3 to 7. Pronotum parallel-sided; with few scattered, long flying hairs; sparsely irregularly punctate; usually posterior median area of disc impunctate. Scutellum triangular truncate posteriorly. Prosternal process expanded apically narrowly closing cavities; mesosternal process subdeclivous in front of coxae, as wide as the coxal cavities; median projection of mesosternum not examined; meso-metasternum notch narrowly rounded; ventrites finely punctate, each puncture with long erect seta. Legs. profemora clavate, meso- and metafemora feebly clavate, apices rounded; tibiae straight, tibial carina weakly present on metatibia. Elytra coarsely subserially punctate, each

puncture with a long suberect seta second interval with distinct line of coarse white setae; apex truncate; humeral angle rounded.

Female differs by the shape of the last antennomere.

Length: 8mm

Distribution: Jamaica (Fig. 10)

Type Material Studied: LECTOTYPE female (here designated) *Poeciloderma lineolatum* White (BMNH) labeled: [red circle] Type/ [round label] Jamai; ca [underside] 46; 84 *Poeciloderma; lineolatum; (type)* White; [in White's hand writing]/ *P. , leucogrammus* White; Jamaica [in Chevrolat's hand writing]/ LECTOTYPE; *Poeciloderma; lineolatum; White; desig. M. A. Ivie 2001. PARALECTOTYPE* female? (BMNH) - [round label] Jamaica [underside] 45; 110 / PARALECTOTYPE; *Poeciloderma; lineolatum; White; desig. M. A. Ivie 2001.*

HOLOTYPE female? *Eriphus leucogrammus* White (BMNH) labeled: [red circle] Type/ [round label] Jamai; ca [underside] 46; 84/ *Eriphus; leucogrammus; White* [in White's handwriting].

Other Material Studied: none.

Discussion. This unique and isolated species was placed in *Trichrous* previously, but does not share the synapomorphies of that genus. It is moved here provisionally, until a phylogenetic study of the group can be undertaken. This species has not been seen since the original collections, which bear British Museum (Natural History) catalog numbers referring to 1845 and 1846. I was unable to locate any other specimens of this Jamaican endemic.

This species differs from the other two in the genus in being less obviously mimetic. While the other species are clearly associated with the red and black/blue *Thonalmus*-based mimicry ring (Darlington 1938, Parsons 1940), *P. lineolatum* looks more like a cantharid (*Tylocerus* etc.) or lampyrid (*Photinus*, etc.). This could represent a precursor to the *Thonalmus* association, a reversion, or an independent, non-mimetic color pattern. The size of the eyes and eye facets are largest in this species, also indicating a lack of association with the diurnal *Thonalmus*. Only a phylogenetic study of the group can put this question into a useful light.

The Lectotype male of *Poeciloderma lineolatum* White of is intact except for the right antenna, which is broken between the scape and pedicle (it is glued to the "Type" label), and the missing left metatarsus. It is a male, and the smaller of the specimens mentioned by White, and is the one with the blackish abdomen. The Paralectotype is the larger specimen, and the one with the orangish abdomen. It is apparently a female, but the antennae are broken, and it was not dissected.

The unique holotype of *Eriphus leucogrammus* White conforms exactly to this species, and exhibits the black-abdomen form.

Plectoœcerum pilipenne (Chevrolat) New Combination

Trichrous pilipennis Chevrolat, 1862: 262. Gemminger and Harold, 1872: 2956.

Thomson, 1878:18. Gundlach, 1891: 227. Gahan, 1895:116. Aurivillius,

1912:441. Leng and Mutchler, 1914: 447. Darlington, 1938: 690. Parsons, 1940:

6. Blackwelder, 1946: 586. Cazier and Lacey, 1952: 40. Chemsak, 1969:187. Zayas, 1975: 150. Chemsak and Linsley, 1982: 48. Chemsak, Linsley, and Noguera, 1992: 77. Browne, Peck, and Ivie, 1993: 47. Monné, 1994: 34. Monné and Giesbert, 1995:134. Monné, Tavakilian, and Chevillotte, 2000.

Trichrous irroratus; (not Olivier) Chemsak, 1969:187.

Diagnosis. The nearly cylindrical, impunctate pronotum; and the bicolored elytra with the basal half red to yellowish brown and the apical half black, with dense punctation, each bearing a thin flying hair will distinguish this species from all described West Indian elaphidiines, with the exception of one apparently undescribed species, of uncertain generic placement, from Crooked Island in the Bahamas. From that species, *Plectocerum pilipenne* can be distinguished by the normal last segment of the maxillary palpi, which are greatly expanded in the Bahamian species.

Description. Male: Body elongate subparallel; head, prothorax, venter, most of the femora, and basal half of elytra orange-yellow; antennae, tibiae, tarsi, tip of pro- and mesofemora, and apical half of metafemur brownish black; apical half of elytra dark, with strong metallic blue-purple reflections. Head inclined, front, moderately densely punctate, fine median groove on vertex and front; mandible short stout, tips black; labrum transverse separated from clypeus by membranous band; last maxillary palpolmere moderately expanded; eyes coarsely faceted, deeply emarginate, upper lobe embracing antennal insertion. Antenna as long as the body, scape 5x length of pedicel; mesal antennal spine acuminate, present on segments 3 to 7; antennal carina weakly indicated only on outer segments of larger individuals; clothed in both long erect and recumbent

setae. Pronotum nearly cylindrical, sides faintly rounded; nearly impunctate except for insertion of scattered long flying hairs. Scutellum rounded, longitudinally depressed medially. Prosternal process barely expanded apically; procoxae cavities open; mesosternal process subdeclivous in front coxae, narrower than the coxa cavities; median projection of mesosternum grooved (Fig. 2E); meso-metasternal notch narrowly rounded; ventrites finely punctate, each puncture with a long erect seta. Legs profemora clavate, meso-metafemora feebly clavate, apices rounded; tibiae straight, tibial carina present, distinct on meso and metatibiae. Elytra coarsely, subserially punctate, each puncture with very long suberect blond seta, apex rounded to subtruncate, humeral angle rounded. Metathoracic wing as in Fig. 9A. Male genitalia as in Fig. 9B.

Female (Fig. 11A) slightly larger than males, antennae shorter than in male; the shape of the last antennomere differ as normal for the tribe.

Length: 5-8mm

Distribution: Cuba, Bahamas (Fig. 11).

Type Material Studied. The type of this species was not available for study (see Discussion below).

Other Material Studied: CUBA: 1 m, 2 f- Soledad, 1918, F.4288; Guantanamo ac. 31753; 1 f- Rios co, San Carlos, Est., Guantanamo, 20 May 1916, C.T. Ramsden; 1 m- Pinar del Rio, 16-29-v. 1933, H.V. MacGillavry, (AMNH); 1 m, 4 f- Soledad (Cienfuego) v, vi.39, Parsons; 2 m, 2 f- *ibid.*, May 1936, Darlington; 3 f- NW Foothill Trinidad, v-1-36, Darlington; 3 m- *ibid.*; 2 f- Buenos Aires, Trinidad MTS, May, 8-14, 1936, [2500-2500 ft], Darlington (MZC); 1 f- Cayamas, Geo Dimmock, 17 Apr. 1905; 1 m- *ibid.*,

Baker; 1f- Viñales, April 15/30, S.C. Bruner. [on mogote do la Bandera]; 1 f - Taco, Abril 1-6, 19222, S.C. Bruner, J. Acuna y C.H. Ballow; 1 f- Algoizar, 6-22-27, L. Scaramiza [taken on Eugena sp]; 1 m- TPRF, Ent. No. 3101; 1 m- Rangel P. del Rio, Jun 1935, Frierdr Tippmann. VIEN (NMNH); 1 f- Prov. Santiago, Daiquiri, 1. -4.6. 1985, S. Billy leg.; 1 m- Belic 6 665 [can't read]; P. Stany (NMPC); NMPC, photo.

BAHAMAS ISLANDS: 1 f- South Bimini Isl. BWI, June 1951; 1 m- *ibid.*, Jun 15, 1967, Bk Dozier (AMNH); 1 m- Crooked Is., Gun Point, iii-24-25-65, B.D. Valentine & R.W. Hamilton (MTEC).

Discussion: This is moved here from the genus *Trichrous*.

This species is the only member of the genus whose mimetic association with the lycid *Thonalmus* Bourgeois has been studied. Both Darlington (1938) and Parsons (1940) found that the species was in fact at least partially protected from predation by the lizard *Anolis sagrei* (Duméril & Bibron.), in theory because of the color pattern. Further work on this phenomenon is needed.

The unique type of *T. pilipennis* was from the Gundlach collection (Chevrolat 1862), collected by F. Poey at Havana. This specimen is not in the Chevrolat collection at the BMNH (Horn and Kahle 1936, M. A. Ivie, pers. obs.), and probably is deposited with the Gundlach collection at the Instituto de Ecología y Systemática in Havana, Cuba. Inquires to that collection did not produce any information on the subject. We have followed the usage of previous authors in assigning this species, and found no other species from Cuba that could be confused with Chevrolat's description. Chemsak's record for *T. irroratus* from Cuba belongs to this species.

Plectocerum spinicorne (Olivier)

Callidium spinicorne Olivier, 1795: 68. Schonherr, 1817: 459.

Plectocerum spinicornis: Dejean, 1835: 330. Gemminger & Harold, 1872: 2958.

Gahan, 1895: 119. Aurivillius, 1912:445. Leng & Mutchler, 1914: 448.

Blackwelder, 1946: 586. Chemsak, Linsley & Noguera, 1994: 36. Monné &

Giesbert 1995: 133. Monné, Tavakilian, & Chevillotte, 2000.

Plectocerum cribratum Sallé, 1856: 689. Strauch, 1861: 131. Lacordaire, 1869: 135.

Gemminger & Harold, 1872: 2958. Gahan, 1895: 119. Aurivillius, 1912: 445.

Leng & Mutchler, 1914: 448. Blackwelder, 1946: 586. Chemsak, Linsley &

Noguera, 1994: 36. Monné & Giesbert 1995: 133. Monné, Tavakilian, &

Chevillotte, 2000. NEW SYNONYMY

Diagnosis: The species is easily distinguished by the long antenna, the mesal antennal spine of third antennomere conspicuous, as long or longer than the antennal setation (vs. inconspicuous and shorter than the antennal setae); the pronotum with faint periferal calli; the elytra basally red-orange, apically black to metallic blue with a crenulate surface on the blue portion of the disc. This combination will separate it from all Elaphidiini, and as far as we know, all red/blue West Indian cerambycids.

Description. Male: Body elongate, shining somewhat dorsoventrally depressed; head, scape, prothorax, venter, femora, and basal half elytra orange-red; antennae (except scape), tips of mandibles, tibiae, and tarsi blackish brown; apical half of elytra black with strong metallic blue-purple reflections. Head front impunctate, depressed medially,

subverticle above obvious tentorial pits, inclined below; frontoclypeal suture present, running directly from base of mandible to tentorial pit, then in anteriorly arcuate curve between pits; round-bottomed distinct furrow running between pits sets off a lower frontal bulge between it and frontoclypeal suture labrum broad, trapezoidal, joined to clypeus by distinct membranous band; palpolmeres elongate, not expanded apically; mandible, short, stout; eyes coarsely faceted, deeply emarginate upper lobe embracing antennal insertion. Antennae 5 segments longer than body; scape finely punctate above, transversely grooved or ridged 3 below [stronger in larger specimens may be absent in small males]; scape 4X length of pedicel; mesal antennal spine stout, present on segment 3 to 6; antennal carina obvious, last antennomere very elongate, pseudo subsegmented, sparsely clothed with long erect and recumbent setae. Pronotum trapezoidal, widest in basal quarter, narrowed and transversally impressed at base; disc impunctate, with very few inconspicuous long erect setae four low smooth tubercles on corners of disc, divided by inconspicuous longitudinal median swelling. Scutellum rounded behind. Prosternal process moderately widened apically; procoxal cavities open behind; mesosternum subdeclivous in front of coxae; intercoxal process of mesosternum as wide as coxal cavities, expanded between coxae; anterior margin of mesosternum linear without median projection (Fig. 8F); meso-metasternal notch broadly rounded. Ventrites very sparsely and faintly punctate, each puncture with a long erect seta; first ventrite as long as 2 and 3 together. Legs. Pro- and mesofemora clavate, metafemora feebly clavate, apices dentiform; tibiae straight, tibial carina very distinct on all tibiae. Elytra smooth, shining, glabrous; very finely confusedly punctate to nearly impunctate; few long flying hairs on

pustulate punctures; most specimens with indistinct longitudinal/diagonal swelling from humerus to apical $\frac{1}{4}$; disc variably crenulate between end of swelling and suture on disc of blue portion; apex truncate with small sutural and lateral spines or denticles.

Metathoracic wing as in Fig. 9A. Male genitalia as in Fig. 9C.

Female (Fig. 11C) differs in having the antennae as long as the body; the elytral crenulation stronger and the frontal depression less deep. The sexes can be distinguished by the shape of the last antennomere, which is short and not pseudo-subsegmented in the female.

Length: 8-12mm

Distribution: Hispaniola (Fig. 10)

Type Material studied: Possible Holotype in the BMNH labeled: "*Callidium spinicorne*; Palui. Beauv. St. Dominiques/ Type?; C.; *spinicorne*; Oliv.; St. Domingo; [on underside of label] This specimen may; be the type as writing; on label looks like; Olivier's [signature not legible]".

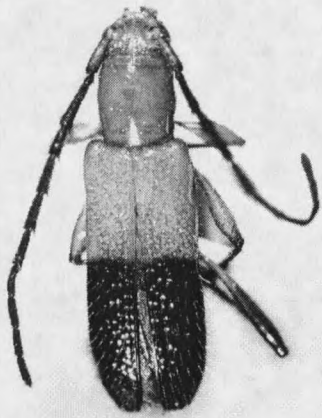
The type of *P. cribratum* Sallé was not studied (see discussion below).

Other material studied: DOMINICAN REPUBLIC: 2 m, 5 f- La Jaguita los Jobos, L.M. Farfan, San Juan, 24-v-1981, Marcano; 1 m- Santo Domingo, D.N. 7-v-1981, Dominguez; 1 f- Rio Masacre, Don Miguel, Dajabon, 3-v-1980, Marcano & Cicero (MHND); 1 f-Santiago, Mata Grande, 19° 12'N 71° 00'W, 11 July 1992, [925m], M.A. & R.O. Ivie (MTEC); 1 f- [8975] & 2 m- [8976, 13372] (MARC){I have to get the record of these species}.

Discussion. This is the most strikingly *Thonalmus*-like of the *Plectocerum* species. It should be included in any study of *Thonalmus* Bourgeois mimicry conducted in the future. The species is not commonly collected, and usually only in small series, but it flies during the day, and is quite obvious when it does (M. A. Ivie, pers. com.).

Olivier's type was from Hispaniola, and the specimen in the BMNH is probably the one, or one of the ones, that he saw.

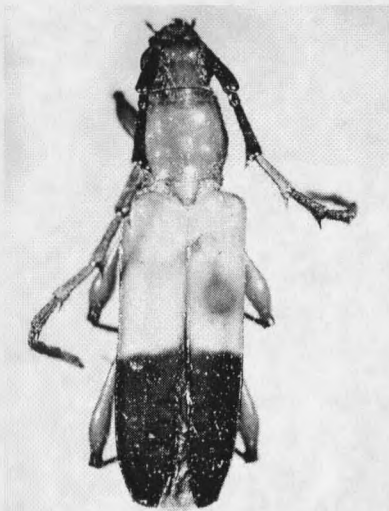
Sallé's type of *P. cribratum* is probably in the Paris museum via the R. Obenthür collection (Horn and Kahle 1936), but was not available to us during the time of this study. He distinguished *P. cribratum* from *P. pilipenne* as having spines on antennomeres 3-6, as opposed to 3-7 for *P. spinicorne*. The development of the spine of antennomere 7 is variable with size, sex and individual. Sallé's illustration and description clearly fit within the variation of this species, and in all the specimens I have seen, there is only one species recognized. Therefore, I propose this synonymy, which can be tested with further work towards a full revision.



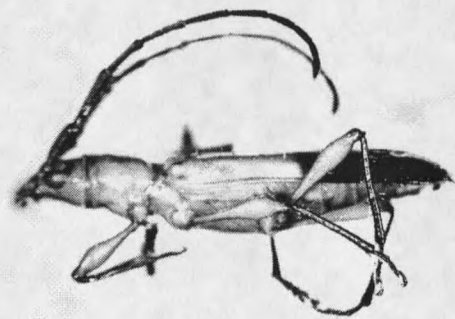
A



B



C



D

Figure 11: (A) *P. pilipenne*, (B) *P. lineolatum*,; (C) *P. spinicorne*
(D) lateral view of *P. spinicorne*

CHAPTER 7

CONCLUSION AND REMAINING PROBLEMS

This study started as a revision of a genus of Heteropsini (*Trichrous*) with 17 recognized species, and ended with a revision of *Trichrous* of Elaphidiini with three recognized species. Along the way the 17 species were distributed between three genera in the two tribes, 2 synonyms were discovered, and a new name was proposed. The first species-level phylogenetic analysis of an elaphidiine genus provides a testable hypothesis of relationships for use in studies of the biology, behavior, and evolution of *Trichrous*.

Plectocerum was reviewed (Elaphidiini), and problems of nomenclature and taxonomy dealt with. Species of the treated genera can now be identified with confidence because of the redescription of the genera and species, and the inclusion of keys and illustrations. This represents a great advance in the understanding of these groups.

However, after all of this work, much remains to be done. The identity of the sister-group of *Trichrous* remains unknown, and the importance of full revisions of *Nesiosphaerion* and *Nesanoplium* in solving that problem is now clear. Problems discovered during the course of this study call for an expansion of Lingafelter's data set to include far more informative characters, and for adding the missing West Indian genera discussed here.

A revision is required to clarify the status and delimitation of the former species of *Trichrous* now moved into the surely polyphyletic genus *Heterops* (Heteropsini). The

possible synonymy of *Heterops prasinus* (Cazier and Lacey) and *Heterops brevicornis* (Zayas) is but one example of unresolved problems at the species level.

Some of our conclusions need to be verified by examination of the types of *Plectocerum cribratum* Sallé, and *Plectocerum pilipenne* (Chevrolat) in Paris and Havana.

And finally, more field work is required to add specimens of many of these rare taxa, obtain material of the immature stages, document host relationships, and study mimetic relationships and behavior.

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Appendix A

SPECIES REMOVED FROM *TRICHOUS* CHEVROLAT AND PLACED IN
HETEROPS BLANCHARD

The Heteropsini is a large heterogeneous group (Fragoso, et al. 1987). Because the genera of that tribe are under review by Dra. Solange Napp and her students (S. Napp, pers. com.), species of Heteropsini formerly included in *Trichrous* are transferred to *Heterops incertae sedis*. *Heterops* is already thought to be polyphyletic, so it is better to place these heteropsine species here, rather than clutter the literature with more generic names that may require synonym at the conclusion of the Napp study. Although *Heterops* is often thought to be distinguished by eburneous maculae on the elytra, not all species included there have them, so the addition of these species without eburneous maculae will not effect the definition of the genus.

During the revision of *Trichrous*, it was necessary to stabilize all names associated with that genus. Therefore, Lectotypes are designated here, where needed, under our role as revisers, even though these species are being moved to *Heterops*.

Heterops Blanchard

Heterops Blanchard, 1842: 51. Thomson, 1864: 203, 431. Lacordaire, 1869: 127.

Cazier and Lacey, 1952: 42. Linsley, 1959: 130. Zayas, 1975: 153. Monné, 1994: 34. Monné and Giesbert, 1995: 132. Monné, Tavakilian, and Chevillotte, 2000.

Heterops basalis (White) NEW COMBINATION

Poeciloderma basale White, 1853: 122. Gahan, 1894: 116.

Trichrous basalis: Chevrolat, 1858: 210. Lacordaire, 1869: 127. Gemmiger and Harold, 1872: 2955. Gahan, 1895: 116. Aurivillius, 1912: 441. Leng and Mutchler, 1914:

447. Gowdey, 1926: 21. Blackwelder, 1946: 586. Cazier and Lacey, 1952: 40. Chemsak and Linsley, 1982: 48. Chemsak, Linsley and Noguera, 1992: 77. Monné, 1994: 34. Monné and Giesbert, 1995: 134. Monné, Tavakilian, and Chevillotte, 2000.

Trichrous jamaicensis Chevrolat, 1858: 211. Lacordaire, 1869: 127. Gemmiger and Harold, 1872: 2956. Gahan, 1895: 116. Aurivillius, 1912: 441. Leng and Mutchler, 1914: 447. Gowdey, 1926: 21. Blackwelder, 1946: 586. Cazier and Lacey, 1952: 40. Chemsak and Linsley, 1982: 48. Chemsak, Linsley, and Noguera, 1992: 77. Monné, 1994: 34. Monné and Giesbert, 1995: 134. Monné, Tavakilian, and Chevillotte, 2000. NEW SYNONYMY

Type material studied: *Poeciloderma basale* White, 1853: 122. LECTOTYPE female (here designated) (BMNH) labeled: [red circle] Type/[round label] Jamaica; [underside] 45;110/ *Trichrous; basalis*; White; (*Poeciloderma*); Jamaica/ *basale* n.s./ Lectotype; *Poeciloderma; basale*; White; desig. M. A. Ivie, 2000. The specimen is missing the right metatibia and tarsus; left protibia and tarsus; and left metatarsus.

PARALECTOTYPE: female (BMNH) labeled: [round label] Jamaica; [underside] 45, 110/ Paralectotype; *Poeciloderma; basale*; White; desig M.A. Ivie, 2000.

Trichrous jamaicensis Chevrolat, LECTOTYPE: female (BMNH) labeled: [red circle] Type/ *Trichrous; jamaicensis*; Chevr.; Jamaica/ *Trichrous; jamaicensis*; Chev. R. Z. 1848; 211 Jamaica/ Lectotype; *Trichrous; jamaicensis*; Chevrolat; desig. M. A. Ivie, 2000.

Other material studied: 7 specimens from Jamaica, deposited in the BMNH.

Heterops bicolor (Sallé) NEW COMBINATION

Mallosoma bicolor Sallé, 1856: 687. Strauch, 1861: 131. Lacordaire, 1869: 127

Gemminger and Harold 1872: 2953. Gahan, 1995: 116. Aurivillius, 1912: 438.

Leng and Mutchler, 1914: 447. Blackwelder, 1946: 586. Chemsak, Linsley, and Noguera, 1992: 76.

Trichrous bicolor Monné and Giesbert, 1992: 251 Monné, 1994: 34. Monné and Giesbert, 1995: 133. Monné, Tavakilian, and Chevillotte, 2000.

Material Studied: None. Type expected to be in Paris.

This move of *Mallosoma bicolor* Sallé from *Trichrous*, to *Heterops* (above), first suggested by Lacordaire (1869), creates a secondary homonym with *Heterops bicolor* Fisher, requiring a replacement name for the Fisher's species (see below).

Heterops brevicornis (Zayas) NEW COMBINATION

Trichrous brevicornis: Chemsak and Linsley, 1982: 48. Chemsak, Linsley, and Noguera, 1992: 76. Monné, 1994: 34. Monné and Giesbert, 1995: 134. Monné, Tavakilian, and Chevillotte, 2000.

Material studied: None. Type in the Zayas Collection, Havana.

Heterops dimidiatipennis (Chevrolat) NEW COMBINATION

Eriphus dimidiatipennis Chevrolat, 1838: 282. Jacquelin du Val, 1857: 264. Damiseau and Cools 1987: 10.

Trichrous dimidiatipennis: Chevrolat, 1858: 210. Chevrolat, 1862: 262. Lacordaire, 1869: 127. Gemmiger and Harold, 1872: 2955. Gundlach, 1891: 227. Gahan, 1895: 116. Aurivillius, 1912: 441. Leng and Mutchler, 1914: 447. Darlington, 1938: 691. Blackwelder, 1946: 586. Cazier and Lacey, 1952: 40. Chemsak, 1969: 187. Zayas, 1975: 149. Chemsak and Linsley, 1982: 48. Chemsak, Linsley, and Noguera, 1992: 77. Monné, 1994: 34. Monné and Giesbert, 1995: 133. Monné, Tavakilian, and Chevillotte, 2000.

Type material studied: *Eriphus dimidiatipennis* LECTOTYPE (BMNH) here designated, labeled: [red circle] Type/ 303/ *Trichrous; dimidiatipennis*; Chev; Cuba./ [green label with Chevrolat's handwriting] *dimidiatipennis* Chev; Rev. Zool. 1838 p 282; *Eriphus*; Cuba [on back side] *Corynetes; rufipes* F; Mexico Sallé Nasst./ bor. Chev.; 63.47*/ Lectotype; *Eriphus; dimidiatipennis*; Chevrolat; desig. M. A. Ivie, 2000. PARALECTOTYPE female (BMNH) labeled: [green label] Cuba; Poey/ *Trichrous; dimidiatipennis*; Chev.; Cuba/ 303/ Bowr. Chevr.; 63.47*/ Paralectotype; *Eriphus; dimidiatipennis*; Chevrolat; desig. M. A. Ivie, 2000. 4 PARALECTOTYPES (ISNB) with a lead label: "*Eriphus; dimidiatipennis*; (type) Chevr.; Rev. Zool." glued to a second, newer label with "f., Rev. Zool. 1838; 282; Syntype." Each of the 4 bears 3 labels: Coll. R.I.Sc.N.B; Cuba; Rec.: M. Lanier/ Syntype/ Paralectotype; *Eriphus; dimidiatipennis*; Chevrolat; desig. M. A. Ivie, 2000.

Other material, 14 specimens from Cuba, (1) PRAGUE, (5) NMNH, (2) FMNH, (1) MZC, and (1) BMNH, 2 (ISNB).

Heterops divisus (Chevrolat) NEW COMBINATION

Trichrous divisus Chevrolat, 1858: 210. Chevrolat, 1862: 262. Gemmiger and Harold, 1872: 2956. Gundlach, 1891: 227. Gahan, 1895: 116. Aurivillius, 1912: 441. Leng and Mutchler, 1914: 447. Darlington, 1938: 690. Parsons, 1940: 6. Blackwelder, 1946:586. Cazier and Lacey, 1952:40. Chemsak, 1969:187. Zayas, 1975:150. Chemsak and Linsley, 1982:48. Chemsak, Linsley, and Noguera, 1992:77. Monné, 1994:34. Monné and Giesbert, 1995:133. Monné, Tavakilian, and Chevillotte, 2000.

Type material studied: *Trichrous divisus* Chevrolat, HOLOTYPE Male (BMNH) labeled: [red circle] Type/ *Trichrous; divisus*; Chev.; Cuba/ *divisus* Ch MRZ; 1858 p.210.8; Cuba/ Bowr Chev. 63-47*.

Other material studied: 14 specimens from Cuba, (5) NMNH, (8) MZC, (1) ZMAN

Heterops fisheri Guerrero and Ivie NEW REPLACEMENT NAME

Heterops bicolor Fisher, 1936 (not *Mallosoma bicolor* Sallé)

For a full synonymy, see Monné, Tavakilian, and Chevillotte, 2000.

Material studied: Because this species was never placed in *Trichrous*, types and other material was not studied.

The move of *Mallosoma bicolor* Sallé, formerly in *Trichrous*, to *Heterops* (above), creates a secondary homonym with *Heterops bicolor* Fisher, requiring a

replacement name for the Fisher's species. This species is treated here purely to provide that replacement name.

Heterops major (Gahan) NEW COMBINATION

Trichrous major Gahan, 1895: 117. Aurivillius, 1912: 442. Leng and Mutchler, 1914: 447. Gowdey, 1926: 22. Blackwelder, 1946: 586. Cazier and Lacey, 1952: 40. Chemsak and Linsley, 1982: 48. Chemsak, Linsley and Noguera, 1992: 77. Monné, 1994: 33. Monné and Giesbert, 1995: 134. Monné, Tavakilian, and Chevillotte, 2000.

Type material studied: *Trichrous major* Gahan, HOLOTYPE male? (BMNH) labeled: [red circle] Type/ Jamaica; 83.9/ *Trichrous*; *major*; Gahan.

Other material studied: none.

Heterops prasinus (Cazier and Lacey) NEW COMBINATION

Trichrous prasinus Cazier and Lacey, 1952: 41. Chemsak and Linsley, 1982: 48.

Chemsak, Linsley, and Noguera, 1992: 77. Browne, Peck, and Ivie, 1993: 47.

Monné, 1994: 34. Monné and Giesbert, 1995: 134. Monné, Tavakilian, and Chevillotte, 2000.

Type material studied: *Trichrous prasinus* Cazier and Lacey HOLOTYPE: female (AMNH) labeled: South Bimini Isl.; Bahamas, B.W.I.; June 1951/ M.Cazier; C. & P. Vaurie; Collectors/ [red square label] Holotype; *Trichrous*; *prasinus*; Cazier & Lacey/ *Trichrous*; *prasinus*; Type.

Other material studied: 5 specimens from the Bahamas, (2) AMNH, (2) FSCA, and (1) NMNH.

Heterops terminalis (White) NEW COMBINATION

Poeciloderma terminale White, 1853: 123. Gemminger and Harold, 1872: 2958.

Trichrous terminalis: Gahan, 1895: 117. Aurivillius, 1912: 442. Leng and Mutchler, 1914: 447. Gowdey, 1926: 22. Blackwelder, 1946: 586. Cazier and Lacey, 1952: 40. Chemsak and Linsley, 1982: 48. Chemsak, Linsley, and Noguera, 1992: 77. Monné, 1994: 34. Monné and Giesbert, 1995: 134. Monné, Tavakilian, and Chevillotte, 2000.

Type material studied: *Poeciloderma terminale* White, LECTOTYPE female (BMNH) labeled: [red circle] Type / [round label] Jamaica; [on underside] 45;110 / *terminalis* White [hand written by White] / Type; [sideways] *Poeciloderma; terminale*; White; Jamaica / Lectotype; *Poeciloderma; terminale*; White; desig. M.A. Ivie 2000.], [specimen is intact but for last segment of right mesotarsus. PARALECTOYPE female (BMNH) labeled: [round label] Jamaica; [on underside] 45;110 / *Poeciloderma; terminale*; White; Jamaica. [both labels are identical to 2nd and 4th on Lectotype].

Other specimens examined: 11 from Jamaica: (7) BMNH, (1) CMN, (2) CMN, and (1) MTEC.

Heterops violaceipennis (Fisher) NEW COMBINATION

Trichrous violaceipennis Fisher, 1942: 22. Blackwelder, 1946: 586. Cazier and Lacey, 1952: 40. Chemsak and Linsley, 1982: 48. Chemsak, Linsley, and Noguera, 1992: 77. Monné, 1994: 34. Monné and Giesbert, 1995: 134. Monné, Tavakilian, and Chevillotte, 2000.

Type material studied: *Trichrous violaceipennis* Fisher, HOLOTYPE male (MCZ) labeled: Mt. Diego de; Ocampo, Dom. Rep.; 3-4,000 ft., July'38; Darlington/ Type No.; *Trichrous; violaceipennis*; Fisher/ M.C.Z.; Type; 23768/ *Trichrous; violaceipennis*; Fisher.

Other material studied: 13 specimens from Hispaniola deposited in (9) FSCA, (3) JWPC, and (1) MTEC.

Heterops vittatus (Fisher) NEW COMBINATION

Trichrous vittatus Fisher, 1932: 69. Blackwelder, 1946: 586. Cazier and Lacey, 1952: 40. Zayas, 1975: 152. Chemsak and Linsley, 1982: 48. Chemsak, Linsley and Noguera, 1992: 77. Monné, 1994: 34. Monné and Giesbert, 1995: 134. Monné, Tavakilian, and Chevillotte, 2000.

Type material studied: *Trichrous vittatus* Fisher, HOLOTYPE male (NMNH) labeled: Sierra Rangel; Cuba, July 30/ E.E.A.; de Cuba; 9445/ [square red label] Type No.; 43746; U.S.N.M.

Other material studied: One specimen from Cuba in NMNH.

Heterops spp.

In addition, 4 other new species were seen in what previously would have been *Trichrous*, belonging to the groups here moved to *Heterops*. These specimens from the Virgin Islands and Hispaniola are (2 WIBF), Puerto Rico (1 NMNH), and Hispaniola (1 MCZ).

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