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REVISION OF THE ANTHONOMUS SUBGENUS ANTHOMORPHUS WEISE
(COLEOPTERA: CURCULIONIDAE)

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ABSTRACT

The 22 species of the *Anthonomus* subgenus *Anthomorphus* Weise are hypothesized to constitute a monophyletic group on the basis of morphological characters of the adult weevils. Other adult morphological characters are cited as evidence in proposing a hypothesis of phylogenetic relationships among the species. The species of *Anthomorphus* occur in the Nearctic, Palearctic and Neotropical faunal realms and are known to have hosts in the plant families Pinaceae, Rosaceae, Malpighiaceae, and possibly Betulaceae. A diagnosis and description of the subgenus and of each of the species in the subgenus, a key, and illustrations are presented as aids in identifying the species. Thirteen new species are described: *A. rosadoneto* (Brazil); *A. howdenorum* (Venezuela); *A. rulfoi* (México); *A. bechyneorum* (Brazil, Honduras, Venezuela); *A. stockwelli* (Panamá); *A. diamantinaensis* (Brazil); *A. camoiranensis* (Venezuela); *A. vanini* (Brazil); *A. bordoni* (México, Venezuela); *A. haliki* (Brazil); *A. chinculticensis* (México); *A. pimentai* (Argentina, Bolivia, Brazil) and *A. galphimiae* (México). Lectotypes are designated for *A. paraguayanus* Hustache and *A. sulcipygus* Champion.

RESUMÉN

Carácteres morfológicos de los adultos indican que las 22 especies de *Anthonomus* del subgénero *Anthomorphus* constituyen un grupo monofilético. Se citan otros rasgos morfológicos de los adultos como evidencia de una hipótesis de las relaciones filogenéticas entre las especies. Las especies de *Anthomorphus* se encuentran en las Regiones Paleártica, Neártica y Neotrópica y tienen plantas hospederas en las familias Pinaceae, Rosaceae, Malpighiaceae, y posiblemente Betulaceae. Se presentan caracteres diagnósticos y una descripción del subgénero y de cada especie del subgénero, además de una clave, y ilustraciones para auxiliar en la identificación de las especies. Se describen trece especies nuevas y se designan lectotipos para dos especies previamente descritas (véase el resumen en inglés).

INTRODUCTION

The *Anthonomus* subgenus *Anthomorphus* Weise contains 22 species that occur in the Nearctic, Palearctic and Neotropical faunal realms. The species have been collected in association with plants in several families, including Betulaceae, Fagaceae, Malpighiaceae, Myricaceae, Rosaceae and Pinaceae. Of these, only Malpighiaceae, Rosaceae and Pinaceae have been established by rearing as actual hosts. Some of the species have been collected on Malpighiaceae in association with species of *Anthonomus* in the *venustus* and *unipustulatus* groups (Clark, 1987; Clark and Burke, 1985) and members of the anthonomine genus *Pseudanthonomus*. The present study was undertaken to provide descriptions or redescriptions, illustrations, and a key to facilitate identification of the species. The information on these species is currently being analyzed to determine their relationships to the *Anthonomus*

venustus and *unipustulatus* groups, the genus *Pseudanthonomus* Dietz and other Anthonominae known or suspected to have hosts in the Malpighiaceae.

MATERIALS AND METHODS

Specimens of 653 adults, including types of most of the previously described species, were examined. These were from collections of the following institutions (abbreviations in parentheses are used to refer to collections in the text): Auburn University Entomological Collections (AUEM), Auburn, W.E. Clark; Museu Paraense Emilio Goeldi (MPEG), Belém, W.L. Overal; Museum of Comparative Zoology (MCZC), Cambridge, S. R. Shaw; Illinois Natural History Survey (INHS), Champaign, J. K. Bouseman; Field Museum of Natural History (FMNH), Chicago, J.S. Ashe; Texas A&M University (TAMU), College Station, H.R. Burke; Universidade Federal do Paraná (DZUP), Curitiba, G. Rosado-Neto; Deutsches Entomologisches Institut (IPZE), Eberswalde, L. Dieckmann; Cornell University (CUIC), Ithaca, J.K. Liebherr; Snow Entomological Museum, University of Kansas (SEMC), Lawrence, P.A. Ashlock; The British Museum (Natural History) (BMNH), London, R.T. Thompson; Universidad Central de Venezuela (IZAV), Maracay, L.J. Joly; The American Museum of Natural History (AMNH), New York, L.H. Herman, Jr.; Canadian National Collection of Insects and Arachnids (CNCI), Ottawa, D.E. Bright; Muséum National d'Histoire Naturelle (MNHP), Paris, H. Perrin; Carnegie Museum of Natural History (ICCM), Pittsburg, J.E. Rawlins; California Academy of Sciences (CASC), San Francisco, D.H. Kavanaugh; Museu de Zoologia (MZSP), Universidade de São Paulo, U. Martins; Centre National de Recherches Agronomiques (LFEV), Versailles, J. d'Aguilar; National Museum of Natural History (USNM), Washington, D.C., D.R. Whitehead; Purdue University (PURC), West Lafayette, A.V. Provonsha. The following provided specimens from their personal collections: C. Bordón (CCBM), Maracay; H.A. Hespeneide (CHAH), Los Angeles; H. and A. Howden (HAHC), Ottawa; M.A. Ivie (CMIV), Columbus; C.W. O'Brien (CWOB), Tallahassee; E.L. Sleeper (ELSC), Long Beach.

Measurements were made with the aid of an ocular micrometer in a dissecting microscope as follows: total length from anterior margin of eyes to elytral apices in lateral view; width across elytra at widest point; length of pronotum from anterior to posterior margins; length of rostrum from anteroventral margin of eye to tip, across arc, in lateral view; length of distal portion of rostrum from antennal insertions to tip in lateral view; width of frons at narrowest point between eyes; width of base of rostrum just distad of eyes in dorsal view; and width of pro- and metafemora in anterior view excluding the ventral teeth. The range and, in parentheses, the mean and sample size of each measurement is given for each species.

Relationships of the species of *Anthomorphus* to each other were analyzed using PAUP, Phylogenetic Analysis Using Parsimony, Version 2.4, developed by Swofford (1985), on an IBM Personal Computer (see Phylogeny section).

Subgenus *Anthomorphus* Weise

Anthomorphus Weise 1883: 255. *Type species* (by subsequent designation: Dieckmann 1968: 470): *Curculio varians* Paykull.

Paranthonomus Dietz 1891: 199. *Type species* (by original designation): *Anthonomus profundus* Le Conte.

Recognition.— The species of *Anthonomus* in the subgenus *Anthomorphus* are distinguished by the following combination of characters:

- 1) abdomen of male (Fig. 37) with sternum 5 subquadrately emarginate, leaving triangular, setose sclerite isolated from posterior margin (except in *A. pinivorax*);
- 2) pygidium of male (Figs. 33–36) and of female (Figs. 38–46) sulcate or impressed (except in *A. diamantinaensis* and female *A. rosadoneto*).

Description.— Male. *Length*: 1.8–4.1 mm. *Width*: 1.0–2.0 mm. *Head*: vertex with median fovea, sparsely, minutely punctate, with narrow, setiform scales; venter with slightly to much broader, more pallid scales, eyes round, posterior margin slightly elevated so that greatest convexity occurs there. *Rostrum*: length 1.0–1.8 x pronotal length; in dorsal view, sides converging slightly from base to antennal insertions, subparallel or gradually diverging from there to tip; proximal portion rugose-punctate to distinctly carinate; dorsal margin of lateral rostral groove carinate, directed to middle of eye; distal portion shallowly punctate to rugose-punctate, length 16–39% of total rostral length; antennal funiculus with 7 articles. *Thorax*: sides evenly rounded from subapical constriction; evenly convex from constriction to base; pronotum densely, coarsely punctate, each puncture giving rise to a narrow scale; broader scales whitish, limited to dorsal midline and to lateral portions, narrower scales aeneous, forming broad lateromedian vittae; pleuron with punctation and vestiture as on pronotum, scales on lower portions slightly broader and more pallid. *Elytra*: humeri not prominent, sides subparallel in basal 1/2; striae deep, punctures slightly impinging on interspaces; interspaces more-or-less uniformly convex, sutural interspaces narrow at extreme base, these and interspaces 2–5 slightly widened and slightly elevated posterior to shallow obliquely transverse depression; each interspace with median row of narrow to setiform scales and lateral rows of slightly broader scales directed toward center of interspace. *Abdomen*: sternum 5 about as long as sternum 4; each sternum with large, platelike, internal apodeme. *Legs*: apices of femora truncate, narrowly emarginate; profemur slightly stouter than metafemur, with large ventral tooth and in some species a smaller, more distal tooth; metafemur with one small acute ventral tooth; protibia straight to slightly, broadly concave medially on dorsal margin, ventral margin with more-or-less abruptly delimited median prominence, with or without preapical tooth, apically uncinata; metatibia more nearly straight than protibia, slightly widened or narrowed at apex.

Female. *Length*: 2.0–4.2 mm. *Width*: 1.0–2.1 mm. *Rostrum*: length 1.2–2.3 x pronotal length; broadly, evenly curved; length of distal portion 25–49% of total rostral length. *Pygidium*: with or without dorsomedian impression or sulcus.

Discussion.— The subgenus *Anthomorphus* was established by Weise (1883: 255) to include *Anthonomus varians* (Paykull) and *A. perforator* (Herbst), along with *A. ater* (Marsham), cited as a synonym of the latter. Weise stated that the subgenus was characterized by the “*unguiculi dentati*” (toothed tarsal claws) of the included species. Dieckmann (1968: 471) noted that this characterization was in error and that, in fact, *A. varians* is the species with untoothed tarsal claws (the “*unguiculi mutici*” of Weise). Dieckmann (1968: 474) listed *A. perforator* as a “Farbaberration” (color variety) of *A. varians* and noted that *A. ater* is a junior synonym of *A. rubi* (Herbst). He listed *A. varians* as type species of the subgenus *Anthomorphus*, noting that that species, like the type species of the subgenus *Paranthonomus* Dietz, has “ein gefurchtes Pygidium.” On the basis of this pygidial character, Dieckmann (1968) also included the Palearctic *A. pinivorax* Silfverberg [as *A. pubescens* (Paykull)]. He listed the name *Anthomorphus* as a synonym of *Paranthonomus*, but did not explain why he used the name *Paranthonomus* for the taxon instead of the older name, *Anthomorphus*.

The name *Paranthonomus* was proposed by Dietz (1891) for a subgenus of *Anthonomus* including the North American *Anthonomus profundus* LeConte, *A. rubidus* LeConte and *A. vulpinus* Dietz, all of which were characterized as having a “deep, longitudinal excavation of the pygidium.” Dietz (1891: 200) also stated that in Europe *Paranthonomus* is “represented by *A. pubescens*, and probably *A. pyrenaicus*.” (The latter name is also a “Farbaberration” of *A. varians*, according to Dieckmann [1968: 474]).

Champion (1903) considered his *sulcipygus* group, including the Panamanian *A. sulcipygus* Champion, to be the same as Dietz’s *Paranthonomus*. Schenkling and Marshall (1934) listed *A. sulcipygus* and 18 additional Neotropical species as members of the subgenus. With the exception of *A. abdominalis* Champion, these species do not have the diagnostic characters of *Anthomorphus* and they are not retained in the subgenus. The relationships of these other species have not been satisfactorily determined, although some have been included in recently completed revisionary studies. For example, *A. melanostictus* and *A. venustus* were assigned to

the *venustus* group by Clark and Burke (1985), and *A. cossonoides* was assigned (as a synonym of *A. instabilis* Faust) to the *gularis* group by Clark and Burke (1986a).

Burke (1962: 205–206) placed *A. unipustulatus* in *Paranthonomus*, citing the sulcate pygidium but noting that in that species the sulcus is “shorter and less deeply excavated” than in *A. profundus* and *A. rubidus*. The association of the Peruvian *A. sulcatus* Kirsch and *A. filicornis* Hustache from Guadeloupe with *Anthomorphus* was not made before the types were examined in connection with the present study. O’Brien and Wibmer (1982:105) and Wibmer and O’Brien (1986: 203) listed *Paranthonomus* as a subgenus of *Anthonomus* but did not indicate which species belong to the group.

The following species are included in the subgenus *Anthomorphus*.

Anthonomus rubidus species group

Anthonomus rubidus LeConte

Anthonomus bordoni new species

Anthonomus paraguayanus Hustache

Anthonomus profundus LeConte

Anthonomus vulpinus Dietz

Anthonomus galphimiae, new species

Anthonomus howdenorum, new species

Anthonomus varians (Paykull)

Anthonomus pinivorax Silfverberg

Anthonomus sulcatus species group

Anthonomus sulcipygus Champion

Anthonomus chinculticensis, new species

Anthonomus vanini, new species

Anthonomus camoiranensis, new species

Anthonomus stockwelli, new species

Anthonomus filicornis Hustache

Anthonomus sulcatus Kirsch

Anthonomus pimentai, new species

Anthonomus bechyneorum, new species

Anthonomus haliki, new species

Anthonomus rulfoi, new species

Anthonomus abdominalis Champion

Anthonomus diamantinaensis, new species

Anthonomus rosadoneto, new species

Males of the species of *Anthomorphus* are distinguished by the characters in the following key. With some exceptions, noted in the treatments of the appropriate species, females are morphologically uniform throughout the subgenus. This presented problems in determining the identity of some species previously described from females only. Furthermore, several females remain among the specimens examined that cannot confidently be associated with identified males or females. Even though non-genitalic characters are preferentially used in the key, the male genitalia provide the best diagnostic characters.

Key to Species of *Anthomorphus* (males only)

1	Abdominal sternum 5 subquadrately emarginate, with triangular, setose sclerite isolated from posterior margin (Fig. 37)	2
1'	Abdominal sternum 5 not subquadrately emarginate, with triangular, setose sclerite isolated from posterior margin	
 <i>A. pinivorax</i> Silfverberg, p. 330	
2 (1)	Tarsal claws simple, without basal tooth	<i>A. varians</i> (Paykull), p. 329
2'	Tarsal claws toothed	3
3 (2')	Pygidium sulcate (Figs. 33–36)	4
3'	Pygidium not sulcate	<i>A. diamantinaensis</i> , new species, p. 340
4 (3)	Metasternum with long, fine, erect, setiform scales	5
4'	Metasternum with scales (somewhat setiform and slightly raised in some, but not erect)	9
5 (4)	Meso- and metafemora with sparse ventral fringe of long, fine, setiform scales	6
5'	Meso- and metafemora without ventral fringe of setiform scales	8
6 (5)	Metatibia with ventral fringe of long, setiform scales	
 <i>A. rulfoi</i> , new species, p. 339	
6'	Metatibia without ventral fringe of setiform scales	7
7 (6')	Profemur with large tooth distal to ventral tooth; pronotum and elytra with fine aenescent scales; aedeagus as in Fig. 48	
 <i>A. bordoni</i> , new species, p. 325	
7'	Profemur with small or obsolescent distal tooth; pronotum and elytra with fine whitish scales; median lobe of male genitalia as in Fig. 47	
 <i>A. rubidus</i> LeConte, p. 323	
8 (5')	Metatibial uncus with apical prominence; pygidial sulcus broad, not delimited apically	<i>A. galphimiae</i> , new species, p. 328
8'	Metatibial uncus without apical prominence; pygidial sulcus narrower, delimited apically	<i>A. howdenorum</i> , new species, p. 328
9 (4')	Profemur with distal tooth distinctly separated from large ventral tooth	10
9'	Profemur without distal tooth, or with slight indication of distal tooth arising from basal portion of ventral tooth	17
10 (9)	Metatibia with ventral fringe of long, aenescent, setiform scales in distal 1/2	<i>A. camoiranensis</i> , new species, p. 332
10'	Metatibia without ventral fringe of setiform scales	11
11 (10')	Elytra with dark discal macula (indistinct and limited to sutural interspaces in <i>A. haliki</i>); strial punctures large, elytral vestiture fasciculate	12
11'	Elytra without dark discal macula; strial punctures smaller, elytral vestiture not fasciculate	13
12 (11)	Vestiture of prothorax broad scales and strongly differentiated setiform scales; meso- and metafemora without ventral fringe of long, fine setiform scales	<i>A. bechyneorum</i> , new species, p. 337
12'	Vestiture of prothorax elongate, narrow, acuminate scales; meso- and metafemora with ventral fringe of long, fine, setiform scales	
 <i>A. haliki</i> , new species, p. 338	

13	(11')	Pygidial channel narrow, shallow (Fig. 35)	14
13'		Pygidial channel broader, deeper	15
14	(13)	Elytra with common middorsal fascia; protibia with long, sparse, ventral setiform scales <i>A. abdominalis</i> Champion, p. 339	
14'		Elytra without middorsal fascia; protibia without ventral setiform scales <i>A. sulcatus</i> Kirsch, p. 334	
15	(13')	Elytral interspace 3 prominent at extreme base <i>A. rosadoneto</i> , new species, p. 341	
15'		Elytral interspace 3 not prominent at base	16
16	(15')	Protibia with preapical tooth; metatibial uncus without apical prominence <i>A. vanini</i> , new species, p. 332	
16'		Protibia without preapical tooth; metatibial uncus with apical prominence <i>A. filicornis</i> Hustache, p. 333	
17	(9')	Pro- and mesocoxae with long setiform scales; profemur with ventral tooth displaced distally, without distal tooth; pygidial sulcus with median carina (Fig. 36) <i>A. pimentai</i> , new species, p. 335	
17'		Pro- and mesocoxae without setiform scales; profemur with ventral tooth not displaced distally, with or without distal tooth; pygidial sulcus without median carina	18
18	(17')	Pygidial sulcus narrow, not delimited apically (Fig. 34); head constricted behind large, prominent eyes, frons delimited posteriorly by transverse channel <i>A. stockwelli</i> new species, p. 333	
18'		Pygidial sulcus broad, delimited apically (Fig. 33); head not constricted behind eyes, frons not delimited by transverse channel	19
19	(18')	Elytral integument darkest on large triangular portion of dorsum extended from humeri to about middle and apically along sutural interspaces	20
19'		Elytral integument not darker on triangular portion of dorsum	21
20	(19')	Metafemur of male straight, ventral tooth not displaced distally; metatibial uncus with prominence; protibia without preapical tooth <i>A. paraguayanus</i> Hustache, p. 325	
20'		Metafemur of male strongly curved, ventral tooth displaced distally; metatibial uncus simple; protibia with preapical tooth <i>A. profundus</i> LeConte, p. 326	
21	(19')	Aedeagus (Fig. 55) abruptly constricted apically to obliquely truncate apical prominence <i>A. sulcipygus</i> Champion, p. 331	
21'		Aedeagus (Fig. 56) constricted distally to symmetrical, rounded apex <i>A. chinculticensis</i> , new species, p. 331	

ANTHONOMUS RUBIDUS SPECIES GROUP

Recognition.— The members of the *rubidus* species group are distinguished by the following combination of characters:

- 1) spiculum gastrale of male genitalia with basal portion closely engaging sides of aedeagus, with ventral keel (Fig. 69) (except in *A. pinivorax*);
- 2) aedeagus with midventral, subbasal lobe (Figs. 47–53) (except in *A. pinivorax*, Fig. 54).

Discussion.— This group includes the two North American, two Palearctic, and five Neotropical species. Three monophyletic subgroups are also recognized. One includes *A. rubidus*, *A. bordoni* and *A. paraguayanus*, all of which have the apical portion of the aedeagus somewhat asymmetrical (Figs. 47–49). Another includes *A. profundus*, *A. howdenorum* and *A. galphimiae*. These have the sutural interspaces slightly to markedly expanded subapically. The last subgroup includes the Palearctic *A. varians* and *A. pinivorax*, distinguished from the New World species by several characters, including possession of sparse, whitish, setiform scales on the elytra. As indicated above, one of these, *A. pinivorax*, lacks the diagnostic characters of the *rubidus* group. It is assigned to the group on the basis of other characters it shares with *A. varians* which indicate that the two are sister species.

Host relationships of the North American species in the *rubidus* group have not been determined with certainty, but the most likely hosts are in the plant family Rosaceae and possibly Betulaceae. Hosts of four of the five Neotropical species are unknown, but at least one is associated with Malpighiaceae. The Palearctic species are unusual among anthonomines in having hosts in the family Pinaceae.

Anthonomus rubidus LeConte

Anthonomus rubidus LeConte, 1876: 199. Hamilton 1885: 106. Dietz 1891: 200–201. Fall 1913: 47. Blatchley and Leng 1916: 291. Burke 1962: 206. *Holotype*: Pennsylvania, male [Penn.] [Type 1959] [J.L. Leconte/Coll.] [*A. rubidus*/Lec.] (MCZC).

Recognition (Fig. 1).— This North American species is distinguished by the following combination of characters:

- 1) mesosternum, abdominal sterna, and meso- and metafemora of male with long, sparse, setiform scales;
- 2) elytra with midbasal macula extended posteriorly on suture (Fig. 2);
- 3) aedeagus slightly asymmetrical (Fig. 47);
- 4) endophallus with sparse, minute proximal denticles, with larger, irregular median denticles (Fig. 47).

It closely resembles *A. bordoni* from Venezuela from which it is distinguished by the smaller, less distinct distal profemoral tooth, the longer, more dense, erect, setiform scales on the metasternum, abdomen, and metafemur and by slight differences in the male genitalia (Figs. 47, 48). It is most likely to be confused with the North American *A. profundus* from which it is distinguished by the following characters:

- 1) vestiture of pronotum and elytra denser (Figs. 1, 2, 5, 6);
- 2) sutural elytral interspaces without subapical prominences (Fig. 5);
- 3) pygidial sulcus narrower in male and female (Figs. 33, 38, 39);
- 4) long setiform scales on male metasternum and meso- and metafemora;
- 5) aedeagus less strongly asymmetrical (Figs. 47, 50);
- 6) profemora less strongly inflated, with more well-developed distal tooth;
- 7) and, protibia without preapical tooth.

As noted by Hamilton (1885: 106), specimens of *A. rubidus* have been confused in collections with those of *Pseudanthonomus crataegi* Walsh. However, as Hamilton noted, “there should not be much trouble in distinguishing (the two species), as *crataegi* has only six joints in the funicle of the antenna, while *rubidus* has seven – a matter readily determined by counting them under a microscope.”

Description.— Male. *Length:* 2.1–2.6 mm (\bar{x} =2.4, n=15). *Width:* 0.9–1.3 mm (\bar{x} =1.2, n=15). *Head:* eyes separated by distance ca. 0.6 x width of rostrum at base. *Rostrum:* slender, length 1.1–1.5 x (\bar{x} =1.3, n=15) pronotal length; broadly, evenly curved; proximal portion rugose-punctate, sulci and carinae obsolete; distal portion finely, sparsely punctate, length 21–28% (\bar{x} =25, n=15) of total rostral length. *Thorax:* pronotum with dark, narrow aenescent scales and with middorsal vitta of long, narrow, pallid whitish scales. *Pygidium:* median sulcus wider and deeper toward apex. *Legs:* profemur slender, ca. 1.3 x stouter than metafemur, with distal tooth that shares common base with larger ventral tooth in some specimens; protibia without preapical tooth; metatibial uncus long, straight, oblique, truncate.

Female. *Length:* 2.2–2.6 mm (\bar{x} =2.4, n=15). *Width:* 1.1–1.3 mm (\bar{x} =1.2, n=15). *Rostrum:* length 1.2–1.4 x (\bar{x} =1.2, n=15) pronotal length; broadly, evenly curved; proximal portion rugose, vestiture limited to proximal 1/3; distal portion smooth, length 27–35% (\bar{x} =30, n=15) of total rostral length. *Pygidium* (Fig. 38): with broadly rounded apicodorsal prominence; median sulcus long, straight to slightly wider posteriorly, with long, dense setae. *Abdomen:* sternum 5 with posterior margin slightly produced medially.

Plant Associations.— Label data indicate that specimens of *A. rubidus* have been collected on the following plants:

Betulaceae

Betula lutea Michx. (under surface of leaves, 1 specimen, McKeever, Herkimer Co., New York)

Corylus (20 specimens, Kappa, Illinois; 2 specimens, Haddon Heights, New Jersey)

Fagaceae

Quercus alba (1 specimen, Westerville, Ohio)

Juglandaceae

wild hickory (1 specimen, Tippecanoe Co., Indiana)

Rosaceae

“cherry” (4 specimens, Tippecanoe Co., Indiana)

Prunus demissa D. Dietr. (1 specimen, Bountiful, Davis Co., Utah)

Prunus serotina J.F. Ehrh. (1 specimen, Albemarle Co., Virginia, 2 specimens, Rhea Co., Tennessee)

“wild cherry” (1 specimen, Tippecanoe Co., Indiana).

Distribution.— This species is widespread in North America from Canada to Florida, westward to Minnesota and Illinois, with an extralimital record in Utah. In addition to the holotype of *A. rubidus* from Pennsylvania, specimens from the following localities were examined.

CANADA. *Québec.* Aylmer (1 female, ICCM). Duparquet (1 female, USNM).

UNITED STATES. *Connecticut.* New Haven Co.: Wallingford (1 female, CWOB). *District of Columbia.* Kennelworth Pond (1 female, TAMU). *Florida.* Duval Co. (1 female, USNM). *Georgia.* White Co.: Helen (2 males, USNM). *Illinois.* (1 female, FMNH; 1 female, ICCM). Woodford Co.: Kappa (4 males, 3 females, TAMU, 8 males, 5 females, USNM). *Indiana.* Tippecanoe Co. (1 female, TAMU, 12 males, 3 females, USNM). *Iowa.* (1 male, USNM). *Kentucky.* Fayette Co.: (1 male, USNM). *Maryland.* Garrett Co.: Deer Park (1 female, USNM). Prince Georges Co.: Beltsville (1 female, USNM) (1 female, USNM); Bladensburg (1 female, USNM). Washington Co.: Boonsboro (1 male, 3 females, TAMU). *Massachusetts.* (1 male, SEMC). Adams Co.: Mt. Greylock (1 female, CUI). Barnstable Co.: East Sandwich (1 female, USNM). Natick Co.: Sherborn (1 male, MCZC). *Michigan.* Marquette Co.: Marquette (1 female, USNM). Midland Co.: (1 female, USNM). Muskegon Co.: Henry (1 female, USNM). *Minnesota.* Rice Co.: Nerstrand Woods (1 female, CWOB). *New Hampshire.* Coos Co.: Carter Dome, White Mountains (4 males, USNM); Carter Notch, White Mountains (3 females, USNM). Grafton Co.: Franconia (1 male, AMNH). *New Jersey.* Camden Co.: Haddon Heights (1 male, 1 female, CNCI). Monmouth Co.: Hornerstown (1 female, AMNH). Morris Co.: Budd Lake (1 female, AMNH). *New York.* Herkimer Co.: McKeever (1 female, USNM). Ulster Co.: Slide Mt. (14 males, 1 female, USNM) (2 males, 1 female, USNM). *North Carolina.* Yancey Co.: Black Mountains (1 male, 1 female, AMNH, 1 female, CASC). *Ohio.* (1 male, SEMC). Franklin Co.: Westerville (1 female, ELSC). Hamilton Co.: Cincinnati (1 male, USNM). Hocking Co.: 8 mi. SW Logan, S.R. 664 (1 female, CMIV). *Pennsylvania.* Allegheny Co.: Pittsburg (2 males, 2 females, ICCM). Forest Co.: 1 mi E Neiltown (1 female, USNM). Indiana Co.: Indiana (1 male, AMNH). Northampton Co.: Wind Gap (1 male, CASC). Westmorland Co.: Jeannette, 15, 20, 28 (1 male, CNCI; 3 males, 1 female, ICCM). York Co.: 5 mi. N Davidsburg (1 female, USNM). *Tennessee.* (1 female, USNM). Davidson Co.: Nashville (1 female, USNM). Great Smoky Mountain National Park (2 males, 1 female, HAHC). Rhea Co.: (2 males, USNM) (1 male, 1 female, USNM). Sevier Co.: Gatlinburg (1 male, 1 female, USNM). *Utah.* Davis Co.: Bountiful (1 male, USNM). *Virginia.* Albemarle Co.: (2 males, 1 female, USNM), (1 male, USNM). Alexandria Co.: (1 male, USNM). Washington Co.:

Blacksburg (1 male, USNM). *West Virginia*. Fort Pendleton (1 female, USNM). The specimens were collected in the months of May-October.

Anthonomus bordoni, new species

Type Series.— *Holotype*: Venezuela, male [VENEZUELA: Merida/Jaji/25 June 1983/W.E. Clark and Clark] [Host 83V-09] (USNM). *Paratypes*: México, 1 male [MEXICO, N.L. 2200 m. El/Potosi Mt. 8 km. NW, 18/de Marzo Galeana Aug. 26, 1977 A. Garcia A.] [on pine/& oak]. Venezuela, 4 males, 6 females [VENEZUELA: Merida/Jaji/26 June 1983/W.E. Clark and Clark -] [Host 83V-09]; 1 male [Venezuela AR/Rancho Grande/1100 m 17-VIII-1965] [F. Fernando-Y./J. Salcedo/Cols.] [A La Luz]; 1 female [La Grita m./2300. TACHIRA] [VENEZ. Bordón/leg. 25 III 1985]. Total paratypes, 13 (AUEM, CCBM, CWOB, IZAV, TAMU).

Recognition (Fig. 3).— This species is distinguished by the following combination of characters:

- 1) metasternum, abdominal sterna, and meso- and metafemora with sparse ventral fringe of long setiform scales;
- 2) aedeagus asymmetrical (Fig. 48);
- 3) elytra with midbasal macula extended posteriorly on suture (Fig. 4);
- 4) endophallus with minute proximal denticles, with sparse median denticles and large median tooth (Fig. 48).

It resembles the North American *A. rubidus* from which it is distinguished by the more distinct distal tooth on the profemur and, in the male, by the longer, more dense setiform scales on the metasternum, abdomen, and metafemur. The aedeagus also differs slightly in the two species (Figs. 47, 48).

Description.— Male. *Length*: 2.4–2.8 mm (\bar{x} =2.6, n=6). *Width*: 1.1–1.4 mm (\bar{x} =1.3, n=6). *Head*: eyes separated by distance ca. 0.7 x width of rostrum at base. *Rostrum*: slender, length 1.0–1.5 x (\bar{x} =1.4, n=6) pronotal length; broadly, evenly curved; proximal portion rugose-punctate, sulci and carinae obsolete; distal portion finely, sparsely punctate, length 19–30% (\bar{x} =26, n=6) of total rostral length. *Thorax*: pronotum with elongate, narrow, dark fulvo-aeoneous scales and middorsal vitta of broader, more pallid scales. *Pygidium*: median sulcus broad anteriorly, deeper and slightly wider posteriorly, not extended to apex. *Legs*: profemur narrow, ca. 1.3 x stouter than metafemur; distal tooth small, acute; protibia with acute preapical tooth; metatibial uncus minute, slightly hooked.

Female. *Length*: 2.6–2.9 mm (\bar{x} =2.7, n=8). *Width*: 1.2–1.4 mm (\bar{x} =1.4, n=8). *Rostrum*: length 1.4–1.6 x (\bar{x} =1.5, n=8) pronotal length; broadly, evenly curved; proximal portion rugose, vestiture limited to extreme base; distal portion smooth, length 29–36% (\bar{x} =34, n=8) of total rostral length. *Pygidium*: broadly rounded apically; median sulcus long, narrow, shallow, not wide posteriorly, without setae. *Abdomen*: sternum 5 with posterior margin nearly straight.

Plant Associations.— The type series of *A. bordoni* was taken on an unidentified tree.

Distribution.— This species is known only from the type series from Venezuela and México.

Specific Epithet.— This species is named in Honor of Carlos Bordón of Maracay, Venezuela, as a token of appreciation for his friendship and assistance.

Anthonomus paraguayanus Hustache

Anthonomus paraguayanus Hustache 1939: 55–56. *Lectotype* (here designated): Paraguay, male [Paraguay/Hohenau] [(?)]. [TYPE] [MUSEUM PARIS/1949/Col. A. Hustache] [Anthonomus/paraguayanus/m.] (MNHP). *Paralectotypes*: Paraguay, 1 male [Paraguay/Hohenau] [Syntypus] [Anthonomus/paraguayanus/co-type m.] [Coll. DEI/Eberswalde] (IPZE); 1 female [Paraguay/Hohenau] [(?)]. [TYPE] [MUSEUM PARIS/1949/Col. A. Hustache] (MNHP). Hustache (1939: 55–56) indicated that this species was described from four females, but the IPZE “co-type” and one of two MNHP syntypes examined are males.

Recognition.— This species is distinguished by the following combination of characters:

- 1) metasternum, abdominal sterna, and meso- and metafemora of male without long setiform scales;
- 2) aedeagus asymmetrical, constricted to narrowly rounded apex (Fig. 49);
- 3) metatibial uncus with prominence;

- 4) elytra with midbasal macula extended posteriorly on suture;
- 5) endophallus with sparse proximal denticles and a large distal tooth (Fig. 49).

It closely resembles the North American *A. rubidus* and *A. bordoni* from Venezuela. It is distinguished from these two species by the absence of long setiform scales on the male femora, the distinct prominence on the male metatibial uncus, and by differences in the male genitalia (Figs. 47–49).

Description.— Male. *Length*: 1.8–2.5 mm (\bar{x} =2.2, n=6). *Width*: 1.0–1.1 mm (\bar{x} =1.0, n=6). *Head*: eyes separated by distance ca. 0.8 x width of rostrum at base. *Rostrum*: slender, length 1.0–1.5 x (\bar{x} =1.3, n=6) pronotal length; broadly, evenly curved; proximal portion rugose-punctate, sulci and carinae obsolete; distal portion finely, sparsely punctate, length 27–35% (\bar{x} =32, n=6) of total rostral length. *Thorax*: pronotum with long, narrow aenaescent scales and middorsal vitta of broader, more pallid fulvous scales. *Pygidium*: median sulcus narrow posteriorly, wider and deeper apically. *Legs*: profemur slender, ca. 1.4 x stouter than metafemur, with minute distal tooth that shares common base with larger ventral tooth; protibia without preapical tooth.

Female. *Length*: 2.1–2.4 mm (\bar{x} =2.2, n=2). *Width*: 1.0 mm (\bar{x} =1.0, n=2). *Rostrum*: short, length 1.5 x (\bar{x} =1.5, n=2) pronotal length; slightly, evenly curved; proximal portion smooth, vestiture limited to extreme base; distal portion smooth, length 34–35% (\bar{x} =35, n=2) of total rostral length. *Pygidium*: broadly rounded, apicodorsal prominence obsolete; median sulcus short, shallow, remote from apex, not wider apically. *Abdomen*: sternum 5 with posterior margin slightly concave medially.

Plant Associations.— Unknown.

Distribution.— *Anthonomus paraguayanus* is known only from northern Argentina and southern Brazil. In addition to the lectotype and paralectotypes from Paraguay, the following specimens were examined.

ARGENTINA. *Misiones*. El Dorado (1 female, AMNH).

BRAZIL. *Santa Catarina*: Nova Teutônia (5 males, 1 female, ELSC, HAHC, MZSP). The specimens were collected in August, September and November.

Anthonomus profundus LeConte

Anthonomus profundus LeConte 1876: 198. Schwarz 1890: 232. Hamilton 1895: 376. Pierce 1907: 268. Fall 1913: 46–47. Leng 1920: 322. Schenkling and Marshall 1934: 38. Burke 1962: 206. Hatch 1971: 349–350. *Lectotype* (designated by Burke (1984: 265): Illinois, female [(small golden disc)] [Type/1958] [J.L. LeConte/coll.] [LECTOTYPE/*Anthonomus/profundus/LeC./design. by/H.R. Burke*] [*A. profundus/Lec.*] (MCZC).

Anthonomus vulpinus Dietz 1891: 201. *Lectotype* (designated by Burke 1984: 262–263): Pennsylvania, male [Pa.] [Type/1955] [W.G. Dietz/Coll.] [LECTOTYPE/*Anthonomus/vulpinus/Dietz/design. by/H.R. Burke*] (MCZC). This synonymy was recognized by Fall (1913: 46–47) who stated that "... the differences given by Dietz... do not look as important in the specimens themselves as they appear on paper," as well as by Leng (1920: 322), Schenkling and Marshall (1934: 38), and O'Brien and Wibmer (1982: 109).

Anthonomus profundus vulpinus Dietz: Blatchley and Leng 1916: 291

Recognition (Fig. 5).— This species is distinguished by the following combination of characters:

- 1) metasternum and abdominal sterna, and meso- and metafemora without long setiform scales;
- 2) metafemora of male stout, strongly curved, the single small ventral tooth displaced distally;
- 3) metatibia of male straight, without midventral prominence;
- 4) sutural elytral interspaces with subapical prominences that are widely separated in female (Fig. 39);
- 5) aedeagus strongly curved in distal 1/3 (Fig. 50);
- 6) pygidial sulcus of male broad, slightly narrowed posteriorly, delimited apically (Fig. 33);
- 7) elytra with midbasal macula extended posteriorly on suture;
- 8) endophallus with sparse, minute denticles and a large sclerotized plate (Fig. 50).

It resembles the Mexican *A. galphimiae* from which it is distinguished by the characters listed in the section on that species. It is likely to be confused with the North American *A. rubidus* but the two are distinguished by the characters listed in the section on the latter.

Description.— Male. *Length:* 2.8–4.1 mm (\bar{x} =3.3, n=11). *Width:* 1.2–2.0 mm (\bar{x} =1.5, n=11). *Head:* eyes separated by distance ca. 0.7 x width of rostrum at base. *Rostrum:* length 1.3–1.5 x (\bar{x} =1.4, n=11) pronotal length; most strongly curved over antennal insertions; proximal portion rugose-punctate, sulci and carinae obsolete; distal portion shallowly rugulose-punctate, length 16–25% (\bar{x} =21, n=11) of total rostral length. *Thorax:* pronotum with elongate, acuminate, aeneous setiform scales and middorsal vitta of broader whitish scales. *Legs:* profemur ca. 1.4 x stouter than metafemur, distal tooth obsolete or absent; protibia with small, acute preapical tooth; metatibial uncus short, curved, excavated.

Female. *Length:* 2.5–3.7 mm (\bar{x} =3.1, n=9). *Width:* 1.2–1.7 mm (\bar{x} =1.5, n=9). *Rostrum:* slender, short, length 1.3–1.6 x (\bar{x} =1.5, n=9) pronotal length, most strongly curved over antennal insertions; proximal portion rugose, vestiture limited to extreme base; distal portion smooth, length 28–37% (\bar{x} =31, n=9) of total rostral length. *Pygidium* (Fig. 39): with strongly rounded apicodorsal prominence; median sulcus long, broad, slightly wider apically. *Abdomen:* sternum 5 with posterior margin straight.

Plant Associations.— According to Pierce (1907: 268) “Mr. Schwarz states that this species breeds in *Crataegus* buds.” Schwarz (1890: 232) himself, however, stated that the species “develops within the fruit of *Crataegus crus-galli*, the imago appearing in July.” Label data indicate that specimens of *A. profundus* have been collected on the following plants (the *Larix* record is probably an incidental association):

Rosaceae

Amelanchier canadensis (L.) Medic. (4 specimens, Beltsville, Maryland)

Aronia arbutifolia (L.) Ell. (1 specimen, Beltsville, Maryland)

Aronia “purpuria” (2 specimens, Pemberton, Burlington Co., New Jersey)

Crataegus sp. (2 specimens, Westerville, Franklin Co., Ohio)

Pinaceae

Larix laricina (Du Roi) K. Koch (1 specimen, Volo, Lake Co., Illinois)

Distribution.— This species occurs in eastern Canada and the northeastern United States, westward to Illinois and southward to Texas, and in California and Oregon. The specimens from McMinnville, Oregon, referred to by Hatch (1971: 350), were not examined. In addition to the lectotype of *A. profundus*, which LeConte (1876: 198) stated was from Illinois, and the lectotype of *A. vulpinus* from Pennsylvania, the following specimens were examined.

CANADA. *Nova Scotia.* Dartmouth (1 male, USNM). *Ontario.* Mer Bleue (1 male, 1 female, CNCI); Port Credit (1 female, USNM); Toronto (1 female, USNM).

UNITED STATES. *California.* Trinity Co.: Carrville (1 male, 1 female, CASC). *Illinois.* Lake Co.: Volo (1 female, INHS). *Indiana.* Crawford Co.: (1 female, USNM). Marshall Co.: (1 male, PURC); Starke Co.: (1 male, PURC). *Iowa.* Johnson Co.: Iowa City (1 male, 1 female, USNM). *Maryland.* Garrett Co.: Oakland (4 males, 5 females, USNM). Prince Georges Co.: Beltsville (1 male, CNCI) (1 female, USNM) (2 males, 2 females, USNM) (1 male, 1 female, USNM); Priest Bridge (1 male, USNM). *Massachusetts.* (2 males, 2 females, USNM). Berkshire Co.: North Adams (1 female, USNM). Hampden Co.: Springfield (1 male, USNM) 1 female, USNM). Middlesex Co.: Ashland (1 female, CASC); Framingham (1 male, 3 females, USNM) (1 male, USNM); Natick (1 male, 1 female, CASC); Sherborn (1 female, CASC); Wilmington (1 female, USNM). Plymouth Co.: Marion (1 male, USNM). *Michigan.* Eaton Co.: Grand Ledge (1 female, USNM). Ingham Co.: 2 mi. SW Holt (2 males, TAMU). Ottawa Co.: 1 mi. S. Grand Haven (1 male, 1 female, TAMU). *New Jersey.* Bergen Co.: Ramsey (2 males, USNM). Burlington Co.: Browns Mills (1 male, 1 female, CNCI); Pemberton (2 females, USNM). Essex Co.: Caldwell (1 male, 1 female, USNM); Montclair (1 female, USNM); Newark (1 male, 1 female, USNM). Gloucester Co.: Malaga (2 males, 1 female, USNM) (1 female, USNM); Midwood (1 male, AMNH). Ocean Co.: Lakehurst (7 males, 5 females, USNM). Union Co.: Berkeley Heights (1 female, USNM); Elizabeth, 27 Nov (1 female, USNM). *New York.* New York City (1 male, 6 females, USNM). Nassau Co.: Massapequa (2 males, 1 female, USNM). St. Lawrence Co.: Cranberry Lake (1 female, USNM). *Ohio.* Franklin Co.: Westerville (1 male, 1 female, ELSC). Hamilton Co.: Cincinnati (1 female, USNM). *Oregon.* (1 male, 2 females, USNM). *Pennsylvania.* (4 females, USNM). Clearfield Co.: Clearfield (2 females, USNM). Fayette Co.: Oliver (2 females, USNM). Lycoming Co.: North Mount (1 female, USNM). Monroe Co.: Canadensis (2 females, USNM). *Texas.* (1 male, INHS). *West*

Virginia. Greenbriar Co.: White Sulphur Spring (2 males, USNM). Marion Co.: Fairmont (1 female, CASC). Pocahontas Co.: Cranberry Glades (1 male, CMIV). The specimens were collected in the months of April-August.

Anthonomus galphimiae, new species

Type Series.— *Holotype*: México, male [MEXICO: Chiapas/ 27 km SE Teopisca/ 22 Sept. 1981/ Clark and Coe] [collected on/*Galphimia glauca* Cav., det./W.R. Anderson, 1981] (USNM). *Paratypes*: México, 4 males, 3 females [MEXICO: Chiapas/27 Km SE Teopisca/ 22 Sept. 1981/ Clark and Coe] [collected on/*Galphimia glauca* Cav., det./W.R. Anderson 1981]; 1 male [MEXICO. Oax. Hwy 175/ 10 Km NE Oaxaca/ 1800 m 16.VI.1979/ H & A Howden]. Total paratypes, 8 (AUEM, HAHC, TAMU).

Recognition (Figs. 7).— This species is distinguished by the following combination of characters:

- 1) metasternum and abdominal sterna, but not meso- and metafemora, with long, fine erect, aeneous, setiform scales;
- 2) pygidial sulcus of male broad, not narrowed posteriorly, not delimited apically;
- 3) pygidial sulcus of female broad, deep, wider apically (Fig. 40);
- 4) aedeagus symmetrical, expanded apically (Fig. 51);
- 5) elytra with midbasal macula extended posteriorly on suture (Fig. 8);
- 6) endophallus with sparse, minute proximal denticles, a small distal field of denticles, a small toothlike sclerite and lightly sclerotized tube (Fig. 51).

It resembles *A. profundus* in having the pygidial sulcus of the male and female unusually broad and deep (Figs. 33, 39, 40), but is distinguished from that species by the coarser vestiture, less strongly inflated, less strongly curved femora that have larger ventral teeth which are not displaced distally, and by the shape of the aedeagus (Figs. 50, 51).

Description.— *Male*. *Length*: 3.2–3.5 mm (\bar{x} =3.4, n=6). *Width*: 1.5–1.7 mm (\bar{x} =1.6, n=6). *Head*: eyes separated by distance ca. 0.8 x width of rostrum at base. *Rostrum*: length 1.4–1.5 x (\bar{x} =1.4, n=6) pronotal length; broadly, evenly curved; proximal portion rugose-punctate, sulci and carinae obsolete; distal portion shallowly rugulose-punctate, length 19–23% (\bar{x} =22, n=6) of total rostral length. *Thorax*: pronotum with elongate, acuminate, ferruginous scales and middorsal vitta of broader whitish scales. *Legs*: profemur ca. 1.1 x stouter than metafemur, with small, acute distal tooth; protibia with short, acute preapical tooth; metatibial unculus large, with basal prominence.

Female. *Female*: 3.2–3.3 mm (\bar{x} =3.3, n=3). *Width*: 1.6–1.7 mm (\bar{x} =1.6, n=3). *Rostrum*: length 1.4–1.5 x (\bar{x} =1.5, n=3) pronotal length; broadly, evenly curved; proximal portion rugose, vestiture limited to proximal 1/3; distal portion smooth, length 37–39% (\bar{x} =38, n=3) of total rostral length. *Pygidium* (Fig. 40): with broad, apicodorsal prominence; medium sulcus delimited by narrow carina, with long, dense, setae. *Abdomen*: sternum 5 with posterior margin slightly produced, with slight apicolateral prominences.

Plant Associations.— The type series was collected on Malpigiaceae (*Galphimia glauca* Cav.).

Distribution.— This species is known only from the type series from México.

Specific Epithet.— The name of this species is an anagram of the generic name of its host.

Anthonomus howdenorum, new species

Type Series.— *Holotype*: Venezuela, male [VENEZUELA: Tach.: 3300m. 55 km. NE/ San Cristobal/ V.17–18.1974/ H. & W. Howden] (HAHC). *Paratypes*: Venezuela, 1 male, 1 female [VENEZUELA: H. & A. Howden]; 1 male [VENEZUELA: Tachira/ Pueblo Hondo/ 28 June 1983/ W.E. Clark and Clark]; 1 female [Páramo la Negra/ Venezuela, Táchi-/ ra m./ 24–VI–1979] [B. Bechyne/ leg.]. Total paratypes, 4 (AUEM, HAHC, IZAV).

Recognition (Fig. 9).— This species is distinguished by the following combination of characters:

- 1) metasternum and abdominal sterna, but not meso- and metafemora, with long, fine, erect, setiform scales;
- 2) elytra with subfasciculate white, fulvous and fuscous scales;

- 3) sutural elytral interspaces slightly expanded subapically;
- 4) aedeagus (Fig. 52) strongly asymmetrical;
- 5) endophallus with minute proximal denticles and a large toothlike sclerite (Fig. 52);
- 6) elytra with midbasal macula extended posteriorly on suture (Fig. 10).

The aedeagus of this species is similar in form to that of *A. profundus* (Figs. 50, 52). The distinctive pattern of strongly differentiated, subfasciculate, white, fulvous and fuscous elytral scales is unique among known *Anthomorphus*.

Description.— Male. *Length*: 2.8–3.1 (\bar{x} =2.9, n=3). *Width*: 1.2–1.4 mm (\bar{x} =1.3, n=3). *Head*: eyes separated by distance ca. 0.8 x width of rostrum at base. *Rostrum*: length 1.4–1.5 x (\bar{x} =1.4, n=3) pronotal length; most strongly curved over antenna insertions; proximal portion rugose-punctate, sulci and carinae obsolete; distal portion shallowly rugulose-punctate, length 20–22% (\bar{x} =21, n=3) of total rostral length. *Thorax*: pronotum with elongate, acuminate ferruginous scales and middorsal vitta of broader whitish scales. *Pygidium*: median sulcus narrow, wider and deeper apically. *Legs*: profemur ca. 1.3 x stouter than metafemur, with small distal tooth; protibia with large, acute preapical tooth; metatibial uncus slender, straight, oblique.

Female. *Length*: 3.0–3.2 mm (\bar{x} =3.1, n=2). *Width*: 1.4–1.5 mm (\bar{x} =1.4, n=2). *Rostrum*: stout, length 1.5 x (\bar{x} =1.5, n=2) pronotal length; slightly, evenly curved; proximal portion sulcate, vestiture extensive almost to antennal insertions; distal portion smooth, length 31–32% (\bar{x} =32, n=2) of total rostral length. *Pygidium*: with strongly rounded apicodorsal prominence; median sulcus narrow, deep, not wider apically, with long, dense setae. *Abdomen*: sternum 5 with posterior margin slightly produced medially.

Plant Associations.— Unknown.

Distribution.— This species is known only from the type series from Venezuela.

Specific Epithet.— This species is named in honor of Henry and Ann Howden of Ottawa, Ontario, Canada, in appreciation of their friendship and encouragement.

Anthonomus varians (Paykull)

Curculio varians Paykull 1792: 16. *Type Material*: Sweden, not examined, lost (Dieckmann 1968: 473).

Anthonomus varians (Paykull). Dieckmann 1968: 473–478 (synonyms listed).

Recognition (Figs. 11, 12).— This species is distinguished by the following combination of characters:

- 1) elytra with sparse setiform scales;
- 2) eyes small, round, prominent;
- 3) femora strongly inflated;
- 4) rostrum slender, smooth, glabrous from base to tip;
- 5) tarsal claws simple, without basal tooth;
- 6) ventral margin of metatibia of male curved;
- 7) aedeagus symmetrical, narrowed distally (Fig. 53);
- 8) endophallus unarmed (Fig. 53).

It is distinguished from the other Palearctic species of *Anthomorphus*, *A. pinivorax*, by the curved male metatibia (Dieckmann, 1968: Fig. 38), the unarmed tarsal claws and the asymmetrical, distally narrowed aedeagus (Fig. 53). It resembles *A. pinivorax* in several characters by which the two Palearctic species are distinguished from their New World relatives. These are the sparse setiform elytral scales, the small round, prominent eyes, the strongly inflated femora, the slender, smooth, glabrous rostrum and the unarmed endophallus of the male genitalia.

Description.— (see Dieckmann, 1968: 475).

Plant Associations.— Dieckmann (1968: 475–477) reported that *A. varians* occurs on *Pinus sylvestris* L., *P. montana* Mill., and occasionally on *Picea abies* L. Dieckmann also cited various authors who stated that the larvae develop in the buds of the young shoots or in the cones, and according to his own observations, in the male inflorescences.

Distribution.— According to Dieckmann (1968: 477) *A. varians* is widespread throughout Europe, the Near East, and central and eastern Siberia.

Anthonomus pinivorax Silfverberg

Anthonomus pinivorax Silfverberg 1977: 14. Replacement name for *Curculio pubescens* Paykull 1792: 12 (not Fabricius 1775: 131). Dieckmann 1968: 478–479 (lists synonyms). *Lectotype*: Sweden (designated by Dieckmann 1968: 478), not examined.

Recognition.— This species is distinguished by the following combination of characters:

- 1) elytra with sparse setiform scales;
- 2) eyes small, round, prominent;
- 3) femur strongly inflated;
- 4) rostrum slender, smooth, glabrous from base to tip;
- 5) tarsal claws with basal tooth;
- 6) metatibia of male straight;
- 7) aedeagus symmetrical, widened distally (Fig. 54);
- 8) endophallus unarmed (Fig. 54);
- 9) abdomen of male with sternum 5 not subquadrately emarginate, without triangular, setose sclerite isolated from posterior margin (Fig. 37).

It is distinguished from the other Palearctic species of *Anthomorphus*, *A. varians*, by the straight male metatibia (Dieckmann, 1968: Fig. 39), the symmetrical aedeagus that is widened distally (Fig. 54), and the toothed tarsal claws.

Description.— (see Dieckmann, 1968: 478–479).

Plant Associations.— Dieckmann (1968: 479) reported that *A. pubescens* occurs on *Picea abies* L., *Pinus sylvestris* L. and *P. nigra* Arn. He stated that the eggs are laid in the buds of the young apical shoots and, less frequently, in side shoots. The buds are completely destroyed by the larval feeding. The presence of the weevils in the young shoots is evidenced by yellowing of the needles. At the tips of the infested buds the larvae construct cells out of the excrement and frass that also enclose the needles. Larvae were found in these cells in May and June, and in July pupae were found there.

Distribution.— This species occurs in central, northern, eastern and southeastern Europe (Dieckmann, 1968: 479).

ANTHONOMUS SULCATUS SPECIES GROUP

Recognition.— The members of this species group are distinguished by the following characters:

- 1) spiculum gastrale of male genitalia with basal portion flat, not closely engaging aedeagus, without ventral keel (Fig. 70);
- 2) aedeagus without midventral, subbasal lobe (Figs. 55–68).

Discussion.— This group of 14 Neotropical species is probably paraphyletic. Several monophyletic subgroups of the group are evident, but relationships among these subgroups cannot be satisfactorily resolved on the basis of observed characters. Known hosts of the members of the group are species of Malpighiaceae.

Anthonomus sulcipygus Champion

Anthonomus sulcipygus Champion 1903: 177. *Lectotype* (here designated): Panamá, male [♂] [Sp. Figured.] [V. de Chiriquí/ below 4,000 ft./ Champion.] [B.C.A.Col.IV.4./ *Anthonomus/ sulcipygus/ Champ.*] (BMNH). *Paralectotypes*: Panamá, 2 males, 1 female [Caldera,/ 2400 ft.; Champion.] [(♂) (♂♀)] [B.C.A.Col.IV.4./ *Anthonomus/ sulcipygus/ Champ.*] (BMNH); 1 female [San Lorenzo,/ Panama./ Champion] [*A. sulcipygus/ Ch.*] (BMNH). Champion 1910: 186. Champion (1903: 177) stated that *A. sulcipygus* was represented by eight specimens, all from Panamá ("Volcan de Chiriquí" and Caldera). The eight syntypes examined included specimens labelled "V de Chiriquí," "Caldera," and "San Lorenzo." The latter locality (also in the Department of Chiriquí) was not mentioned in the original description but presumably the specimen bearing that label was among the eight syntypes. Only four of the original eight syntypes represent the species described here. The other three syntypes are *A. sulcatus*.

Recognition (Figs. 13, 14).— This species is distinguished by the following combination of characters:

- 1) aedeagus with obliquely truncated apical projection (Fig. 55);
- 2) pygidial sulcus of female long, deep, well-defined (Fig. 41);
- 3) rostrum of female long, slender, strongly curved (Fig. 13);
- 4) endophallus with large proximal field of dense, minute denticles, a large tooth-like sclerite and a more distal, serrate sclerite (Fig. 55).

Characters by which *A. sulcipygus* is distinguished from the related *A. sulcatus* and *A. pimentai* are discussed under the treatment of the latter species.

Description.— Male. *Length*: 2.8–3.4 mm (\bar{x} =3.0, n=9). *Width*: 1.3–1.6 mm (\bar{x} =1.4, n=9). *Head*: eyes separated by distance ca. 0.6 x width of rostrum at base. *Rostrum*: slender, length 1.6–1.8 x (\bar{x} =1.7, n=9) pronotal length; evenly curved; proximal portion rugose-punctate, sulci obsolete; distal portion finely, sparsely punctate, length 24–30% (\bar{x} =27, n=9) of total rostral length. *Thorax*: pronotum with elongate, narrow aeneous scales and middorsal vitta of broader, whitish scales. *Pygidium*: median sulcus narrow, deeper and wider apically, not reaching apex. *Legs*: profemur ca. 1.4 x stouter than metafemur; distal tooth obsolete; protibia with acute preapical tooth; metatibial uncus curved, with slight basal process.

Female. *Length*: 2.8–3.2 mm (\bar{x} =3.0, n=7). *Width*: 1.3–1.5 mm (\bar{x} =1.4, n=7). *Rostrum*: length 1.5–2.2 x (\bar{x} =1.9, n=7) pronotal length; strongly, evenly curved; proximal portion rugose, vestiture limited to extreme base; distal portion smooth, length 31–47% (\bar{x} =40, n=7) of total rostral length. *Pygidium*: with broadly rounded apicodorsal prominence; median sulcus long, deep, widened apically, with long, dense setae. *Abdomen*: sternum 5 with posterior margin nearly straight.

Plant Association.— Label data indicate that specimens of *A. sulcipygus* were collected on Malpighiaceae, *Byrsonima coccolobifolia* H.B.K. (1 specimen, reared from flower bud, Fazenda Campininha, Mun. Mogi-Guaçu, São Paulo, Brazil).

Distribution.— This species is represented by specimens from widely separated localities in México, Nicaragua, Panamá and southern Brazil. In addition to the type series from Panamá, the following specimens were examined.

BRAZIL. *Minas Gerais*: Nova Lima, *São Paulo*: Fazenda Campininha, Mun. Mogi-Guaçu (1 female, MZSP).

MEXICO. *Veracruz*: Coyame, Catemaco (2 males, TAMU). The specimens on which Champion's (1910: 186) Managua, Nicaragua, record were based have not been examined. The specimens were collected in the months of February, June and September.

Anthonomus chinculticensis, new species

Type Series.— *Holotype*: México, male [MEXICO:/ Chiapas/ Chincultic Ruins/ August 29, 1982/ Clark and Cave] (USNM).

Recognition.— This species is distinguished by the following characters:

- 1) aedeagus constricted subapically, rounded at narrow apex (Fig. 56);
- 2) endophallus with small, obtuse denticles, a large tooth, and a long serrate sclerite (Fig. 56).

It closely resembles *A. sulcipygus* but differs in characters of the male genitalia. In *A. chinculticensis* the aedeagus is narrowed distally, then slightly expanded at the extreme apex

(Fig. 56), whereas in *A. sulcipygus* the aedeagus is abruptly constricted to an obliquely truncate apical prominence (Fig. 55).

Description.— Male. *Length*: 2.7 mm (n=1). *Width*: 1.4 mm (n=1). *Head*: eyes separated by distance ca. 0.6 x width of rostrum at base. *Rostrum*: length 1.5 x (n=1) pronotal length; most strongly curved over antennal insertions; proximal portion rugose-punctate, length 23% (n=1) of total rostral length. *Thorax*: pronotum with elongate, acuminate, fuscous scales, without middorsal vitta of broader, more pallid scales. *Pygidium*: median sulcus narrow, slightly wider and deeper apically; with shallow, narrow, lateral sulci. *Legs*: profemur ca. 1.4 x stouter than metafemur, with small distal tooth that shares common base with large ventral tooth; protibia with small preapical tooth; metatibial uncus large, curved, oblique, with slight prominence.

Female. Unknown.

Plant Association.— Unknown.

Distribution.— This species is known only from the type locality from southern México.

Specific Epithet.— The name of this species is derived from the name of the type locality, the site of a small Mayan pyramid.

Anthonomus vanini, new species

Type Series.— *Holotype*: Brazil, male [Rio de Janeiro/ Guanabara BRAZIL] [IX63] (MZSP). *Paratypes*: Brazil, 2 males [Rio de Janeiro/ Guanabara BRAZIL] [IX63]. Total paratypes, 2 (AUEM, TAMU).

Recognition.— This species is distinguished by the following combination of characters:

- 1) aedeagus slightly asymmetrical, with narrow apical projection (Fig. 57);
- 2) endophallus with minute denticles and two large tooth-like sclerites (Fig. 57);
- 3) metatibia of male without setiform scales.

It resembles *A. camoiranensis* in possession of an acute apicomedian projection on the aedeagus (Figs. 57, 58). It is distinguished from that species in lacking a dense apicoventral fringe of setiform scales on the metatibia of the male.

Description.— Male. *Length*: 2.9–3.0 mm (\bar{x} =3.0, n=3). *Width*: 1.2–1.5 mm (\bar{x} =1.4, n=3). *Head*: eyes separated by distance ca. 0.7 x width of rostrum at base. *Rostrum*: length 1.4–1.5 x (\bar{x} =1.4, n=3) pronotal length; most strongly curved over antennal insertions; proximal portion strongly carinate; distal portion finely, sparsely punctate, length 24–26% (\bar{x} =25, n=3) of total rostral length. *Thorax*: pronotum with elongate, narrow, aenescent scales and a narrow, middorsal vitta of broader, more pallid whitish scales. *Pygidium*: median sulcus narrow, wider and deeper apically. *Legs*: profemur ca. 1.3 x stouter than metafemur, with distinct distal tooth; protibia with preapical tooth; metatibial uncus minute, acute.

Female. Unknown.

Plant Associations.— Unknown.

Distribution.— This species is known only from the type series from southern Brazil.

Specific Epithet.— This species is named for Sergio A. Vanin of São Paulo, Brazil, in appreciation of his friendship and encouragement.

Anthonomus camoiranensis, new species

Type Series.— *Holotype*: Venezuela, male [VENEZUELA: Bolívar/ Gran Sabana (Camoiran)/ 19 June 1984/ W.E. Clark] [*Byrsonima/ crassifolia*] (L.) H.B.K.] (USNM).

Recognition.— This species is distinguished by the following combination of characters:

- 1) metatibia of male with dense apicoventral brush of long, curved, setiform scales in distal 1/2;
- 2) metatibia of male without apical uncus;
- 3) aedeagus with narrow apical projection;
- 4) endophallus with small distal field of moderately large denticles, one slightly larger than the other (Fig. 58).

It is distinguished from the closely related *A. vanini* by characters listed in the treatment of that species.

Description.— Male. *Length*: 2.9 mm (n=1). *Width*: 1.2 mm (n=1). *Head*: eyes separated by distance ca. 0.6 x width of rostrum at base. *Rostrum*: length 1.4 x (n=1) pronotal length; most strongly curved over antennal insertions; proximal portion rugose-punctate, sulci obsolete; distal portion smooth, sparsely punctate, 35% (n=1) of total rostral length. *Thorax*: pronotum with narrow, acuminate aeneous scales and middorsal vitta of broader, whitish scales. *Pygidium*: median sulcus narrow, wider and deeper apically, slightly asymmetrical. *Legs*: profemur ca. 1.2 x stouter than metafemur, with distinct distal tooth; protibia long, slender, without preapical tooth.

Female. Unknown.

Plant Association.— The holotype of *A. camoiranensis* was collected on Malpighiaceae (*Byrsonima crassifolia* (L.) H.B.K.).

Distribution.— This species is known only from the type locality in southeastern Venezuela.

Specific Epithet.— The name of this species is derived from the name of the type locality.

Anthonomus stockwelli, new species

Type Series.— *Holotype*: Panamá, male [Panamá, C.Z./ Coco solo Hosp./ 9°21'N, 79°51'W/ 20 Jan. '72 Stockwell] (USNM). *Paratypes*: Panamá, 1 male [Panamá: Canal Zone/ Barro Colorado Is./ 9°10'N 79°50'W] [16.VII.1978/ E.M. Fisher]; 1 male [Panamá: Colon Prov./ Santa Rita Ridge/ 9°22'N, 79°44'W/ 13 June, '76: E.G. Riley]. Total paratypes, 2 (CHAH, CWOB).

Recognition.— This species is distinguished by the following combination of characters:

- 1) head constricted behind large, prominent eyes (Fig. 15), transversely channelled behind frons;
- 2) pygidial sulcus of male narrow, not delimited apically (Fig. 34);
- 3) aedeagus (Fig. 59) narrowed apically to long, acuminate point;
- 4) endophallus unarmed (Fig. 59);
- 5) body form narrow (Fig. 16).

Description.— Male. *Length*: 2.2–3.0 mm (\bar{x} =2.7, n=3). *Width*: 1.3–1.4 mm (\bar{x} =1.4, n=3). *Head*: eyes separated by distance ca. 0.6 x width of rostrum at base. *Rostrum*: length 1.1–1.4 x (\bar{x} =1.3, n=3) pronotal length; most strongly curved over antennal insertions; proximal portion rugose-punctate, sulci obsolete; vestiture obsolete slightly proximad of antennal insertions; distal portion shallowly, finely punctate, length 17–28% (\bar{x} =17–28% n=3) of total rostral length. *Thorax*: pronotum with elongate, acuminate, fulvous to fulvo-ferruginous scales and middorsal vitta of broader, more pallid whitish scales. *Legs*: profemur ca. 1.4 x stouter than metafemur, with distinct distal tooth; protibia without preapical tooth; metatibial uncus minute, oblique.

Female. Unknown.

Plant Association.— Unknown.

Distribution.— This species is known only from the type series from Panamá.

Specific Epithet.— The species is named for Henry P. Stockwell, collector of the holotype, in honor of his contribution to the study of the Curculionidae.

Anthonomus filicornis Hustache

Anthonomus filicornis Hustache 1929: 257. *Holotype*: Guadeloupe, female [GUADELOUPE/ Gourbeyre/ L Dufau. A. Hust.] [MUSEUM PARIS/ 1949/ Col. A. HUSTACHE] [Anth./ filicornis/ m.] (MNHP).

Recognition (Figs. 17, 18).— This species is distinguished by the following combination of characters:

- 1) aedeagus asymmetrical, narrowed to obtusely pointed apex (Fig. 60);
- 2) endophallus with minute proximal denticles, with larger denticles and a small tooth-like distal sclerite (Fig. 60);
- 3) pygidium of female produced and narrowed apically (Fig. 42);
- 4) posterior margin of female 5th abdominal sternum subtruncately produced;

5) pygidial sulcus of male with long lateral setae.

Description.— Male. *Length*: 2.4–2.9 mm (\bar{x} =2.7, n=12). *Width*: 1.2–1.4 mm (\bar{x} =1.3, n=12). *Head*: vertex minutely punctate, with whitish, setiform scales; eyes prominent in profile, round, posterior margins not elevated, separated by distance ca. 0.6 x width of rostrum at base. *Rostrum*: length 1.4–1.7 x (\bar{x} =1.5, n=12) pronotal length; slightly curved; proximal portion shallowly rugose, glabrous; distal portion sparsely, shallowly punctate, length 25–32% (\bar{x} =28, n=12) of total rostral length. *Thorax*: pronotum with narrow, acuminate to setiform, fulvous to aenescant scales and middorsal vitta of pallid, broader whitish scales. *Pygidium*: median sulcus narrow, deeper and wider apically. *Abdomen*: sternum 5 with broad, subtruncate, posterior marginal prominence. *Legs*: profemur ca. 1.3 x stouter than metafemur, distal tooth blunt; protibia with slight preapical tooth; metatibial uncus large, truncate.

Female (Figs. 17, 18). *Length*: 2.8–3.0 mm (\bar{x} =2.7, n=15). *Width*: 1.2–1.5 mm (\bar{x} =1.3, n=15). *Rostrum*: length 1.5–1.8 x (\bar{x} =1.6, n=15) pronotal length; broadly, evenly curved; proximal portion with sulci obsolete, glabrous, except for setiform scales at extreme base; length of distal portion 30–41% (\bar{x} =36, n=15) of total rostral length.

Plant Associations.— Label data indicate that *A. filicornis* has been collected on the following plants:

Malpighiaceae

Byrsonima stipulacea Adr. Juss. (5 specimens, 8 km. S Kilometro 88, Bolívar, Venezuela);

Byrsonima spicata (Cav.) DC (2 specimens, 3 km. W La Tigrera and 5 km. N Las Trincheras, Bolívar, Venezuela).

Myricaceae

Myrica splendens (SW) DC (1 specimen, Sainte-Rose, Piton, Guadeloupe).

It seems most likely that the *Byrsonima* are true hosts but that the *Myrica* record is an accidental association.

Distribution.— This species is represented by specimens from the Lesser Antilles, Panamá, Venezuela and Brazil. In addition to the female holotype from Guadeloupe, the following specimens were examined:

BRAZIL. *Minas Gerais*: Prata (1 female, CCBM). *Pernambuco*: Caruaru (1 male, DZUP). Goiás: Dianópolis (1 female, MZSP). *São Paulo*: Fazenda Pau d'Alho (1 male, MZSP).

GADELOUPE. *Sainte-Rose, Piton, 300 m* (1 male, LFEV).

PANAMA. *Panamá*: Cerro Campana (1 male, USNM). *Cocle*: 10 mi SW. Penonome (1 male, SWOB).

VENEZUELA. *Bolívar*: 8 km. S Kilometro 88 (3 males, 2 females, AUEM); 3 km. W La Tigrera (2 females, AUEM); 5 km. N Las Trincheras (2 females, AUEM). *Delta Amacuro*: Isla C. Mánamo, 25 km. S Tacúpita (1 female, CCBM). *Guárico*: Morrocayos (1 male, IZAV). *Lara*: Jabon (1 male, AUEM). *Portuguesa*: Mesa de Cavacas (1 male, 1 female, AUEM). *Yaracuy*: 7 km. W Nirgua (9 females, AUEM, TAMU). The specimens were collected in the months of February, April, June-August and November.

Anthonomus sulcatus Kirsch

Anthonomus sulcatus Kirsch 1874: 431. *Holotype*: Peru, female [Pozuzu/ Kirsch] [TYPUS] [Staatl. Museum für/ Tierkunde Dresden] [Anthonomus/ sulcatus Ksch.] (SMTD).

Recognition (Figs. 19, 20).— This species is distinguished by the following combination of characters:

- 1) aedeagus with asymmetrical apical projection (Fig. 61);
- 2) endophallus with sparse mesal and distal denticles and a large, proximal sclerite (Fig. 61);
- 3) pygidial sulcus of male narrow, shallow (Fig. 35);
- 4) pygidium of female with broadly rounded apical prominence, sulcus short, shallow (Fig. 44).

It is distinguished from the similar *A. filicornis* by the male genitalia (Figs. 60, 61) and the female pygidium (Figs. 42, 44). Characters by which *A. sulcatus* is distinguished from the

related *A. sulcipygus* and *A. pimentai* are listed under the treatment of the latter.

The genitalia of the males of *A. sulcatus* from México and Panamá differ from those from Brazil in having the apex somewhat constricted before the asymmetrical apical prominence.

There is uncertainty about the identity of this species because the holotype is a female and the reliability of the diagnostic characters listed cannot be ascertained while the females of related species (*A. vanini*, *A. camoiranensis*, *A. stockwelli*, and *A. chiniculticensis*) remain unknown.

Description.— Male. *Length*: 2.0–2.8 mm (\bar{x} =2.5, n =10). *Width*: 1.0–1.4 mm (\bar{x} =1.2, n =10). *Head*: eyes prominent, separated by distance ca. 0.6 x width of rostrum at base. *Rostrum*: slender, length 1.3–1.6 x (\bar{x} =1.5, n =10) pronotal length; broadly, evenly curved; proximal portion rugose-punctate, sulci and carinae obsolete; distal portion finely, sparsely punctate, length 25–34% (\bar{x} =29, n =10) of total rostral length. *Thorax*: pronotum with narrow, aeneous scales and narrow middorsal vitta of broader, more pallid scales. *Pygidium* (Fig. 35): median sulcus narrow, curved, slightly wider apically. *Legs*: profemur ca. 1.2 x stouter than metafemur; distal tooth obsolete; protibia with long, acute preapical tooth; mesotibia with ventral, subapical prominence; metatibial uncus short, truncate.

Female. *Length*: 2.3–2.8 mm (\bar{x} =2.6, n =15). *Width*: 1.1–1.4 mm (\bar{x} =1.2, n =15). *Rostrum*: slender, length 1.3–1.7 x (\bar{x} =1.5, n =15) pronotal length; broadly, evenly curved; distal portion smooth, length 32–44% (\bar{x} =37, n =15) of total rostral length. *Abdomen*: posterior margin of sternum 5 slightly produce medially.

Plant Association.— Label data indicate that the host plant of *A. sulcatus* is: Malpighiaceae, *Heteropterys xanthophylla* Adr. Juss. (3 females, reared from flower buds, Belo Horizonte, Minas Gerais, Brazil).

Distribution.— This species is known from widely separated localities in México, Panamá, Peru and Brazil. In addition to the female holotype from Peru, the following specimens were examined.

BRAZIL. *Mato Grosso*: Chapada dos Guimaraes (1 female, MPEG). *Minas Gerais*: Belo Horizonte, UFMG Campus (3 females, AUEM, MZSP); Cachoeira do Campo (3 females, AUEM, MZSP); ca 5 km. S Conceição do Mato Dentro (4 females, AUEM, MZSP); São Sebastião das Aguas Claras, Nova Lima (5 males, 20 females, AUEM, MZSP, TAMU); São Sebastião das Aguas Claras, Nova Lima (2 females, AUEM, MZSP); São Sebastião das Aguas Claras, Nova Lima (1 male, 2 females, AUEM, MZSP); Serro (4 females, AUEM, MZSP). *Rio de Janeiro*: Mt. Corcovado (1 male, 2 females, TAMU). *São Paulo*: Fazenda Pau d'Alho, Itú (1 female, MZSP); Ilha dos Buzios (1 male, MZSP). *Santa Caterina*: Nova Teutônia (1 female, ELSC).

MEXICO. *Guerrero*: 6 mi. NE Taxco (1 male, CWOB).

PANAMA. (from the type series of *A. sulcipygus*, BMNH) 1 female [(♀)] [V. de Chiriquí, / 25–4000 ft. / Champion.] [B.C.A.Col.IV.4. / Anthonomus / sulcipygus / Champ.] [Type]; 1 male, 2 females [(♂♀)] [V. de Chiriquí, / 25–4000 ft. / Champion.] [B.C.A.Col.IV.4. / Anthonomus / sulcipygus / Champ.]. The specimens were collected in January and September–December.

Anthonomus pimentai, new species

Type Series.— *Holotype*: Brazil, male [Brazil: Minas Gerais/ São Sebastião das Aguas/ Claras, Nova Lima/ 3 Sep 1984 W.E. Clark] (MZSP). *Paratypes*: Argentina, 1 male [Puerto Iguazú, m 200, MISIONES/ ARGENT. Bordón/ leg. 27 XII 1980]. Bolivia, 1 female [BOLIVIA, S.C., 10/ mi. W. Portachuelo/ March 24, 1978 at/ night CW&L O'Brien]. Brazil, 2 males, 11 females [Brazil: Minas Gerais/ São Sebastião das Aguas/ Claras, Nova Lima/ 3 Sep 1984 W.E. Clark]; 1 female [BRAZIL: M.G., São/ Sebastião das Aguas/ Claras, Nova Lima/ 16 Dec 1980 R.P. Martins] [Taken on/ Malpighiaceae/ Banisteriopsis?]; 1 female [Itapetinga/ Bahia Brazil]; 1 female [BRAZIL: Minas Gerais/ Belo Horizonte UFMG/ Campus 4 Oct 1985/ Hécio R. Pimenta] [reared from flower/ buds Heteropterys/ umbellata Adr. Juss. (Malpighiaceae)]; 1 female [BRAZIL: Minas Gerais/ Belo Horizonte UFMG/ Campus 10 Oct 1985/ Hécio R. Pimenta] [reared from flower/ buds Tetrapterys/ humilis Adr. Juss. (Malpighiaceae)]; 1 male, 8 females [Brazil: Minas Gerais/ Belo Horizonte UFMG/ campus/ N.S. Domingos] [(*Stigmaphyllon/ lalandianum*) / (C15 19 Apr 82) (C13 3 Apr 81) (C13 13 Nov 81) (C4 31 Aug 81) (C15 12 Apr 82) (C13 04 Apr 82) (*Banisteriopsis/ malifolia*) / (15 12 Apr 82) (B17 14 Jan 82)]; 6 females [BRAZIL: Minas Gerais/ Belo Horizonte UFMG/ Campus, Sep 1985/ Hécio R. Pimenta] [reared from flower/ buds Heteropterys/ xanthophylla Adr. Juss. (Malpighiaceae)]; 4 females [BRAZIL: Minas Gerais/ Belo Horizonte UFMG/ Campus, 3 Sep 1985/ Hécio R. Pimenta] [reared from flower/ buds Tetrapterys/ humilis Adr. Juss. / (Malpighiaceae)]; 5 females [BRAZIL: Minas Gerais/ Belo Horizonte UFMG/ Campus, 4 Oct 1985/ Hécio R. Pimenta] [reared from flower/ buds Heteropterys/ umbellata Adr. Juss. / (Malpighiaceae)]; 2 males [BRAZIL: Minas Gerais/ Belo Horizonte UFMG/ Campus, 4 Oct 1985/ Hécio R. Pimenta] [reared from flower/ buds Tetrapterys/ humilis Adr. Juss. / (Malpighiaceae)]; 7 females [BRAZIL: M.G., Belo/

Horizonte, UFMG/ Campus 18 May 1985/ R.P. Martins] [reared from flower/ buds *Banisteriopsis/ oxyclada* Adr. Juss.)/ *Gates* (Malpighiaceae)]; 2 males, 1 female [BRAZIL: M.G., Belo/ Horizonte, UFMG/ Campus 27 Apr 1985/ R.P. Martins] [reared from flower/ buds *Banisteriopsis/ oxyclada* Adr. Juss.)/ *Gates* (Malpighiaceae)]; 1 female [BRAZIL: M.G., Belo/ Horizonte, UFMG/ Campus 27 Apr 1985/ R.P. Martins] [reared from; *Stigmaphyllon/ sp.*]; 1 female [Itapetinga/ Bahia Brazil]; 2 males, 5 females [BRAZIL, Mato Grosso/ Sinop (12°31'S, 55°37'W) X 1974/ M. Alvarenga]; 1 male, 1 female [MACAIBA/ R.G. Norte BRASIL/ 22.VII.1951/ M. Alvarenga legit.] [Ex coleção/ M. Alvarenga]; 6 males, 9 females [Macaíba/ RN Brasil/ (I.XII.1951) (XII.1951)/ M. Alvarenga col.]; 3 males, 5 females [NATAL/ R.G. Norte Brasil/ VII 1951/ M. Alvarenga leg.] [Ex coleção/ M. Alvarenga]; 2 males, 1 female [Nova Teutônia/ SC, Brasil/ XII.1965/ F. Plaumann col.]; 8 males, 8 females [Nova Teutônia, Santa Catarina, Brasil (XII-15-53) (I-5-55) (I-25-55) (XII-25-55) (XII-26-56) (I-15-57) (I-25-57)] [F. Plaumann/ Collr.] [E.L. Sleeper/ Collection]; 1 male [BRASIL: S. Catarina/ Nova Teutônia/ 300-500 m/ 27°11'S 52°23'W] [-X.1974/ F. Plaumann]; 1 male, 2 females [Dpt^o Zool/ UF-PARANA] [Brasilien/ Nova Teutônia/ 27°11'B. 52°23'L/ Fritz Plaumann/ 300 . 500m/ (X, 1969) (XII 1980)]; 5 males, 6 females [Brasilien/ Nova Teutônia/ 27°11'B. 52°23'L/ Fritz Plaumann/ (I 1954) (III 1954) (IV 1954) (IX 1954) (XII 1955)/ 300 . 500 m]; 1 male [Brasilien/ Nova Teutônia/ 27°11'B. 52°23'L/ Fritz Plaumann/ XI 1942/ 300 bis 500 m]; 1 male [S. Roque SP/ 25 XII.71/ F. Lane Col.]; 1 male [7.VII.1955/ Barueri/ S. Paulo/ 5465] [K. Lenko leg.]; 1 female [BRAZIL: São Paulo/ Botucatu, Cerrado/ de Usina 8 Apr 1980/ P.S. Oliveira] [Taken on/ *Byrsonima/ coccolobifolia*]; 1 female [Barueri/ S. Paulo - Brasil/ 18.IV.1955/ K. Lenko col.]. Total paratypes, 128 (AUEM, CCBM, CWOB, DZUP, ELSC, MZSP, TAMU).

Recognition (Figs. 21, 22).— This species is distinguished by the following combination of characters:

- 1) profemur long, stout, ventral tooth displaced distally;
- 2) pro- and mesocoxae and bases of profemora of male with long setiform scales;
- 3) aedeagus with broad, asymmetrical, emarginate, apical projection (Fig. 62);
- 4) rostrum of female long, slender, strongly curved;
- 5) pygidial sulcus of male broad, deep, carinate medially (Fig. 36);
- 6) endophallus with minute proximal denticles and a long, lightly sclerotized tube (Fig. 62).

The characters of the coxae and male genitalia distinguish males of *A. pimentai* from those of the related *A. sulcatus* and *A. sulcipygus*. The females of *A. pimentai* are distinguished from females of the other two species by the relatively long rostrum. Additionally, the profemur is considerably less stout in *A. sulcipygus* and also has a well-developed tooth distal to the large ventral tooth. Conversely, in *A. sulcatus*, the profemur is stout, but the stoutness is not displaced distally and there is an obsolete tooth distal to the large ventral tooth. *A. pimentai* is also distinguished from *A. sulcatus* and *A. sulcipygus* by characters of the female pygidium, but these are difficult to assess without dissection. In *A. pimentai* the impression is shallow but near the apex (Fig. 43) and visible even in specimens in which the pygidium is but narrowly exposed. In *A. sulcipygus* the pygidial channel is long, deep, and relatively well-defined (Fig. 41), whereas in *A. sulcatus* the channel is short, shallow, and displaced anteriorly so that it is visible only in specimens with the pygidium broadly exposed (Fig. 44).

The males of *A. pimentai* from Santa Catarina and from Argentina have shorter setiform scales on the pro- and mesocoxae than do those from Minas Gerais.

Description.— Male. *Length*: 2.4–3.0 mm (\bar{x} =2.8, n=15). *Width*: 1.1–1.4 mm (\bar{x} =1.3, n=15). *Head*: eyes separated by distance ca. 0.7 x width of rostrum at base. *Rostrum*: length 1.6–1.8 x (\bar{x} = 1.7, n=15) pronotal length; broadly, evenly curved; proximal portion sulcate, strongly carinate; distal portion finely, sparsely punctate, length 22–32% (\bar{x} =27, n=15) of total rostral length. *Thorax*: pronotum with elongate, narrow, aenescent scales and middorsal vitta of broader, more pallid whitish scales. *Legs*: profemur ca. 1.4 x stouter than metafemur; protibia with obsolete preapical tooth; metatibial uncus minute, acute.

Female. *Length*: 2.3–3.4 mm (\bar{x} =2.8, n=15). *Width*: 1.1–1.7 mm (\bar{x} =1.4, n=15). *Rostrum*: long, slender, length 2.0–2.3 x (\bar{x} =2.2, n=15) pronotal length; strongly, evenly curved; proximal portion shallowly sulcate, vestiture limited to extreme base; distal portion smooth, length 30–49% (\bar{x} =43, n=15) of total rostral length. *Pygidium* (Fig. 43): with broad, rounded, apicomedian prominence. *Abdomen*: sternum 5 with posterior margin slightly produced medially.

Plant Associations.— There are no published host records. Label data indicate that *A. pimentai* is associated with the following plants:

Malpighiaceae

Banisteriopsis malifolia (Nees & Mart) Gates (3 specimens, Belo Horizonte, Minas Gerais, Brazil)

Banisteriopsis oxyclada Adr. (Juss.). Gates (10 specimens, reared from flower buds, Belo Horizonte, Minas Gerais, Brazil)

Byrsonima coccolobifolia H.B.K. (1 specimen, Cerrado de Usina, Botucatu, Brazil)

Heteropterys umbellata Adr. Juss. (6 specimens, reared from flower buds, Belo Horizonte, Minas Gerais, Brazil)

Heteropterys xanthophylla Adr. Juss. (6 specimens, reared from flower buds, Belo Horizonte, Minas Gerais, Brazil)

Stigmaphyllon lalandianum (6 specimens, Belo Horizonte, Minas Gerais, Brazil)

Stigmaphyllon sp. (1 specimen, reared from flower bud, Belo Horizonte, Minas Gerais, Brazil)

Tetrapterys humilis Adr. Juss. (7 specimens, reared from flower buds, Belo Horizonte, Minas Gerais, Brazil)

Distribution.— This species is known only from the type series from southern Brazil, Bolivia and northern Argentina.

Specific Epithet.— This species is named for Hécio R. Pimenta of Belo Horizonte, Brazil, as a token of appreciation for his help and friendship.

Anthonomus bechyneorum, new species

Type Series.— *Holotype:* Brazil, [Rio de Janeiro/ Guanabara BRAZIL] [VIII63] (MZSP). *Paratypes:* Brazil, 1 male, 3 females [Rio de Janeiro/ Guanabara BRAZIL] [VIII63]; 1 female [Guanabara, Rio/ de Janeiro Brazil]; 1 male [Corumbá de Goiás/ GO, Brasil/ 31.I.3.II.1962/ J. Bechyné col.]; 1 male, 1 female [Caraguatatuba - SP/ (Res. Flor. - 40 m)/ 2-IV-962 - Martins/ Reichardt & Silva]; 1 male [Caraguatatuba - SP/ (Res. Flor. - 40 m.)/ 22-V. -I. VI. 1962/ Exp. Dep. Zool.]. Colombia, 1 male, 1 female (COLOMBIA) [Villavicencio/ 23-I-76/ J.A. Jimenez] [Semilla/ arbol/ maderable]. Honduras, 1 male [HONDURAS, Atl./ Liberia, 5-IX-1984/ C.W. O'Brien, rainforest]; 1 female [HONDURAS, Atl./ La Ceiba, CURLA/ 30 Aug. 1984/ C.W. O'Brien]. Trinidad, 2 males [6-1/2 mi. Post, Maracas/ Bay, Trinidad./ W. I. Aug (8) (13), 1969/ H. & A. Howden]. Venezuela, 3 females [VENEZUELA: Tachira/ Pueblo Nuevo/ 29 June 1983; W.E. Clark and Clark]. Total paratypes, 17 (AUEM, CWOB, HAHC, MZSP, USNM).

Recognition (Fig. 23).— This species is distinguished by the following combination of characters:

- 1) elytra with dark middorsal macula (Fig. 24);
- 2) prothorax with broad scales and narrower, setiform scales;
- 3) scales on rostrum dense almost to antennal insertions;
- 4) scales on elytra not fasciculate;
- 5) aedeagus with asymmetrical, emarginate apical prominence (Fig. 63);
- 6) endophallus minutely denticulate (Fig. 63);
- 7) meso- and metafemora without long setiform scales;
- 8) pygidial sulcus of male shallow, narrow, delimited apically.

The male genitalia of *A. bechyneorum* are similar to those in *A. haliki* (Figs. 63, 64), but *A. bechyneorum* is smaller in size, has more distinct middorsal elytral macula (Figs. 24, 26), and lack long setiform scales on the male meso- and metafemora.

The males of *A. bechyneorum* from Honduras lack the apicomedian emargination of the apical prominence of the aedeagus.

Description.— Male. *Length*: 2.3–3.3 mm (\bar{x} =3.0, n=7). *Width*: 1.0–1.5 mm (\bar{x} =1.4, n=7). *Head*: eyes separated by distance ca 0.8 x width of rostrum at base. *Rostrum*: length 1.3–1.5 x (\bar{x} =1.5, n=7) pronotal length; most strongly curved over antennal insertions; proximal portion rugose-punctate, sulci and carinae obsolete; distal portion shallowly rugulose-punctate, length 19–33% (\bar{x} =25, n=7) of total rostral length. *Thorax*: pronotum with elongate, acuminate to setiform aeneous scales and with middorsal vitta of broader, more pallid fulvous scales. *Pygidium*: median sulcus narrow, wider and deeper apically. *Legs*: profemur ca. 1.4 x stouter than metafemur, with small, blunt distal tooth; protibia with short preapical tooth; metatibial uncus large, curved, with basal prominence.

Female. *Length*: 3.0–3.6 mm (\bar{x} =3.3, n=9). *Width*: 1.4–1.6 mm (\bar{x} =1.5, n=9). *Rostrum*: stout, length 1.5–1.7 x (\bar{x} =1.6, n=9) pronotal length; slightly, evenly curved; proximal portion rugose-punctate, vestiture extensive almost to antennal insertions; distal portion smooth, length 25–32% (\bar{x} =30, n=9) of total rostral length. *Pygidium*: with rounded apicodorsal prominence; median sulcus ovate, shallow, with sparse, elongate scales. *Abdomen*: sternum 5 with posterior margin nearly straight.

Plant Associations.— Unknown.

Distribution.— This species is known from the type series from widely separated localities in Central and South America.

Specific Epithet.— This species is named for J. and B. Bechyné. Their efforts have resulted in great enrichment of collections of South American Curculionidae and other insects.

Anthonomus haliki, new species

Type Series.— *Holotype*: Brazil, male [Atibaia/ São Paulo./ 18.XI 1971./ F. Halik/ 11655] (MZSP). *Paratypes*: Brazil, 2 males, 5 females [Atibaia/ São Paulo./ (26.XI 1971.) (18.XI 1971) (17.XI 1971)/ F. Halik/ (11607) (11608) (11654) (11676) (11677) (11678) (11679)]. Total paratypes, 7 (AUEM, MZSP).

Recognition (Figs. 25, 26, 64).— This species is distinguished by the following combination of characters:

- 1) meso- and metafemora of male with long, fine, setiform scales;
- 2) pronotum and elytra with pallid olivaceous and slightly narrower aeneous scales;
- 3) elytral striae punctures oversized, giving pallid scales slightly fasciculate appearance (Fig. 26);
- 4) males with scales on rostrum extensive almost to antennal insertions;
- 5) aedeagus with asymmetrical apical prominence (Fig. 64);
- 6) endophallus without denticles, with a large, distal, tooth-like sclerite (Fig. 64);
- 7) pygidial sulcus of male narrow, delimited proximad of apex.

This relatively large *Anthonomorphus* closely resembles *A. bechyneorum* in the shape of the aedeagus (Figs. 63, 64). The two species are distinguished by the larger body size, and smaller, less distinct middorsal elytral macula of *A. haliki* (Figs. 24, 26). In addition, the meso- and metafemora of the male of *A. haliki* have long setiform scales lacking in *A. bechyneorum*.

Description.— Male. *Length*: 4.0–4.1 mm (\bar{x} =4.1, n=3). *Width*: 2.0 mm (\bar{x} =2.0, n=3). *Head*: eyes separated by distance ca. 0.9 x width of rostrum at base. *Rostrum*: length 1.6–1.7 x (\bar{x} =1.7, n=3) pronotal length; slightly, evenly curved; proximal portion rugose-punctate, sulci obsolete; distal portion rugulose-punctate, length 18–19% (\bar{x} =19, n=3) of total rostral length. *Legs*: profemur ca. 1.4 x stouter than metafemur, with minute distal tooth that arises from base of large ventral tooth; protibia with short preapical tooth; metatibial uncus large, curved, with basal prominence.

Female. *Length*: 4.0–4.2 mm (\bar{x} =4.2, n=5). *Width*: 1.9–2.1 mm (\bar{x} =2.0, n=5). *Rostrum*: length 2.1–2.2 x (\bar{x} =2.1, n=5) pronotal length; slightly, evenly curved; proximal portion rugose-punctate, vestiture obsolete well proximad of antennal insertions; distal portion rugulose, length 36–40% (\bar{x} =38, n=5) of total rostral length. *Pygidium*: with rounded apicodorsal prominence; median sulcus ovate, shallow, with sparse, elongate scales. *Abdomen*: sternum 5 with posterior margin nearly straight.

Plant Associations.— Unknown.

Distribution.— This species is known only from the type series from southern Brazil.

Specific Epithet.— This species is named for its collector, F. Halik.

Anthonomus rulfoi, new species

Type Series.— *Holotype*: México, male [MEXICO: Tamaulipas/ 4 mi. W.C. Victoria/ (Cañon del Navillo)/ November 14, 1985/ P. Kovarik, R. Jones/ and K. Haack] (USNM). *Paratypes*: México, 1 male, 2 females [MEXICO: Tamaulipas/ 4 mi. W.C. Victoria/ (Cañon del Navillo)/ November 14, 1985/ P. Kovarik, R. Jones/ and K. Haack]; 1 male [Tamazunchale/ 1.28.53 S(an) L(uis) Potosi./ D.G. Kissinger]; 1 male [Jalapa, Mex./ J.T. Mason]. Total paratypes, 5 (TAMU, USNM).

Recognition (Figs. 27, 28).— This species is distinguished by the following combination of characters:

- 1) metasternum, abdominal sterna and meso- and metafemora with long, fine, setiform scales;
- 2) metatibia of male with long, straight, ventral setiform scales in distal 2/3;
- 3) aedeagus abruptly widened in distal 1/4 to large lateral lobes that give way distally to apical projection with apicolateral projections (Fig. 65);
- 4) endophallus with minute denticles and with a large tooth (Fig. 65);
- 5) distal profemoral tooth obsolete.

Description.— Male. *Length*: 2.5–2.6 mm (\bar{x} =2.6, n=3). *Width*: 1.2 mm (n=3). *Head*: eyes separated by distance ca. 0.6 x width of rostrum at base. *Rostrum*: length 1.5–1.6 x (\bar{x} =1.6, n=3) pronotal length; most strongly curved over antennal insertions; proximal portion shallowly sulcate, feebly carinate; distal portion shallowly rugulose-punctate, length 20–21% (\bar{x} =20, n=3) of total rostral length. *Thorax*: pronotum with elongate, acuminate ferruginous scales and middorsal vitta of broader, white scales. *Pygidium*: median sulcus broad, slightly wider and deeper apically. *Legs*: profemur ca. 1.4 x stouter than metafemur, with minute distal tooth that shares common base with larger tooth; protibia without preapical tooth; metatibia with minute, oblique apical uncus.

Female. *Length*: 2.4–2.5 mm (\bar{x} =2.4, n=2). *Width*: 1.2 mm (n=2). *Rostrum*: slender, length 1.5 x (\bar{x} =1.5, n=2) pronotal length; slightly, evenly curved; proximal portion feebly sulcate, vestiture limited to extreme base; distal portion smooth, length 37–48% (\bar{x} =43, n=2) of total rostral length. *Pygidium*: subquadrate apically, broadly emarginate apicomediaally; median sulcus broad, shallow. *Abdomen*: sternum 5 with posterior margin slightly produced medially.

Plant Associations.— Unknown.

Distribution.— This species is known only from the type series from northeastern México.

Specific Epithet.— This species is named for the late Mexican author Juan Rulfo.

Anthonomus abdominalis Champion

Anthonomus abdominalis Champion 1903: 178. *Holotype*: Panamá, female [San Feliz,/ Panama./ Champion] [(♀) [B.C.A.Col.IV.4./ *Anthonomus/ abdominalis,/ Champ.*] [Type] (BMNH).

Recognition (Figs. 29, 30).— This species is distinguished by the following combination of characters:

- 1) elytra with common, middorsal fascia of dark fuscous scales (Fig. 30);
- 2) protibia of male with sparse fringe of long, setiform scales in distal 1/2;
- 3) aedeagus with asymmetrical apical prominence (Fig. 66);
- 4) endophallus without denticles, with a small tooth (Fig. 66);
- 5) pygidial sulcus of male narrow, shallow.

Description.— Male. *Length*: 2.2–2.3 mm (\bar{x} =2.3, n=2). *Width*: 1.0–1.1 mm (\bar{x} =1.0, n=2). *Head*: eyes separated by distance ca. 0.6 x width of rostrum at base. *Rostrum*: length 1.4–1.5 x (\bar{x} =1.4, n=2) pronotal length; broadly, evenly curved; proximal portion shallowly, irregularly sulcate, feebly carinate; distal portion finely, sparsely punctate, length 23–25% (\bar{x} =24, n=2) of total rostral length. *Thorax*: pronotum with elongate, acuminate, ferruginous scales and middorsal vitta of broader, whitish scales. *Pygidium*: median sulcus narrow, slightly wider and deeper apically. *Legs*: profemur ca. 1.4 x stouter than metafemur, with small distal tooth; protibia without preapical tooth; metatibial uncus large, oblique, excavated, with slight prominence.

Female. *Length*: 2.0–2.8 mm (\bar{x} =2.5, n=11). *Width*: 1.0–1.4 mm (\bar{x} =1.2, n=11). *Rostrum*: slender, length 1.4–1.6 x (\bar{x} =1.5, n=11) pronotal length; slightly, evenly curved; proximal portion feebly sulcate, vestiture limited to extreme base; distal portion smooth, length 35–41% (\bar{x} =38, n=11) of total rostral length. *Pygidium* (Fig. 45): with narrow, rounded apicodorsal prominence; median sulcus broad, deep, wider apically. *Abdomen*: sternum 5 with posterior margin slightly produced medially.

Distribution.— This species is known from Panamá, Trinidad, Venezuela and Brazil. In addition to the female holotype from Panamá, the following specimens were examined.

BRAZIL. *Rondônia*: Vilhena (1 female, MPEG). *São Paulo*: Barueri (1 female, MZSP).

PANAMA. *Canal Zone*: Barro Colorado Island (4 females, CWOB); Barro Colorado Island (2 females, CWOB); Albrook Forest Site, Fort Clayton (1 male, CWOB); 5 mi. NW Gamboa (1 male, 2 females, USNM). *Panamá*: Pacora (1 female, USNM); Panamá (1 female, USNM). TRINIDAD. Morne Bleu (1 female, HAHC). VENEZUELA. *Aragua*: 4.5 km. SE Villa de Cura (1 female, AUEM). The specimens were collected in February, April, May, July, August, and October–December.

Anthonomus diamantinaensis, new species

Type Series.— *Holotype*: Brazil, male [Brazil: Minas Gerais/ Diamantina/ 5 September 1984/ W.E. Clark] (MZSP). *Paratypes*: Brazil, 3 males, 10 females [Brazil: Minas Gerais/ Diamantina/ 5 September 1984/ W.E. Clark]; 1 male [Brazil: Minas Gerais/ São Sebastião das Aguas/ Claras, Nova Lima/ 3 Sep 1984, W.E. Clark]; 1 male, 1 female [BRAZIL: M.G. São/ Sebastião das Aguas/ Claras, Nova Lima/ 16 Dec 80 R.P. Martins] [Taken/ on/ Malpighiaceae/ Banisteriopsis?]; 1 male, 1 female [BRAZIL: M.G., São/ Sebastião das Aguas/ Claras, Nova Lima/ 27 Feb 81 R.P. Martins] [Taken/ on/ Malpighiaceae]; 1 male, 3 females [BRAZIL: Minas Gerais/ Belo Horizonte UFMG/ Campus, 4 Oct 1985/ Hécio R. Pimenta] [reared from flower/ buds Heteropterys/ umbellata Adr. Juss./ (Malpighiaceae)]; 2 males, 1 female [BRAZIL: M.G./ Cardeal Mota/ 17 Sept. 1985/ Clark & Martins]; 2 males [BRAZIL: M.G./ Diamantina/ 13 Sept. 1985/ Clark & Martins]; 1 male [BRAZIL: M.G./ Lagoa Santa/ 12 Sep 80, b.f.111/ R.P. Martins] [?Taken/ on/ Banisteria/ maritima]; 3 females [BRAZIL: Minas Gerais/ MG040 Lagoa Santa/ 18 Oct 1985 R.P. Martins/ Hécio R. Pimenta] [reared from flower/ buds Heteropterys/ umbellata Adr. Juss./ (Malpighiaceae)]; 1 male [BRAZIL: M.G./ Mendanha/ 13 Sept. 1985/ Clark & Martins]; 3 males, 2 females [BRAZIL: M.G./ Serro/ 12 Sept. 1985/ Clark & Martins]; 1 female [Pirineus/ GO, Brasil/ 2.II.1962/ J. Bechyné col.]; 2 females [Cristalina, 1200m/ GOIAS, Brasil/ Bordón 16 XI 83]; 1 female [BRASIL: Est. São Paulo, São Paulo/ 9.XII.1965/ V.N. Alin]; 1 female [BRASIL: Est. São/ Paulo, São Paulo/ 2. 1968/ V.N. Alin]; 1 male, 2 females [Brazil: São Paulo/ Faz. Campininha/ Mun. Mogi-Guaçu/ 15 November 1979] [R.P. Martins/ *Byrsonima/ intermedia/ Cerrado*]; 1 female [BRAZIL: São Paulo/ Botucatu, Cerrado/ de Usina 8 Apr 1980/ P.S. Oliveira] [Taken on/ *Byrsonima/ coccolobifolia*]; 3 males, 1 female [BRAZIL: São Paulo/ Fazenda Campininha/ Mun. Mogi-Guaçu/ 15 Feb 1979 R.P. Martins] [Taken on/ *B./ intermedia*]; 1 male [DPT^o ZOOL/ UF-PARANA] [BATATAIS - SP./ BRASIL 4/1/67/ Pe. J. Moure leg]; 1 female [DPT^o ZOOL/ UF-PARANA] [BATATAIS - S P/ BRASIL - 6-II-1966]; 1 female [Faz. Pau d'Alho/ Itu, SP, Brasil, XI.1960/ U R. Martins col.]. Total paratypes, 52 (AUEM, CCBM, CHAH, CWOB, DZUP, MZSP, TAMU).

Recognition (Figs. 31, 32).— This species is distinguished by the following combination of characters:

- 1) pygidium without median sulcus (Fig. 46);
- 2) aedeagus abruptly constricted subapically, with slight apical projection (Fig. 67);
- 3) endophallus with long, thin-walled tubular sclerites (Fig. 67);
- 4) elytral interspace 3 prominent at extreme base.

The male genitalia of *A. diamantinaensis* are very similar to those of *A. rosadoneto* (Figs. 67, 68), the male of which has a well-developed pygidial sulcus. No characters were found that distinguish the females of the two species.

Description.— Male. *Length*: 1.9–2.4 mm (\bar{x} =2.2, n=15). *Width*: 1.0–1.2 mm (\bar{x} =1.1, n=15). *Head*: eyes separated by distance ca. 0.8 x width of rostrum at base. *Rostrum*: length 1.3–1.8 x (\bar{x} =1.4, n=15) pronotal length; most strongly curved over antennal insertions; proximal portion deeply sulcate, strongly carinate; distal portion finely, sparsely punctate, length 24–36% (\bar{x} =30, n=15) of total rostral length. *Thorax*: pronotum with elongate, narrow, aenescent scales and middorsal vitta of broader, whitish scales. *Pygidium*: subtruncate apically. *Legs*: profemur ca. 1.3 x stouter than metafemur, without distal tooth; protibia with large, acute preapical tooth; metatibial uncus minute, acute.

Female. *Length*: 2.0–2.5 mm (\bar{x} =2.3, n=15). *Width*: 1.0–1.3 mm (\bar{x} =1.1, n=15). *Rostrum*: short, stout, length 1.3–1.7 x (\bar{x} =1.5, n=15) pronotal length; broadly, evenly curved; proximal portion deeply rugose, vestiture limited to extreme base; distal portion smooth, length 25–42% (\bar{x} =32, n=15) of total rostral length. *Pygidium* (Fig. 46): with broad, subquadrate, apicodorsal prominence. *Abdomen*: sternum 5 with posterior margin slightly produced medially.

Plant Associations.— Label data indicate that *A. diamantinaensis* has the following host plants of the family Malpighiaceae:

Banisteriopsis maritiana (Adr. Juss.) Cuatr. (1 specimen, Lagoa Santa, Minas Gerais, Brazil).

Byrsonima coccolobifolia H.B.K. (1 specimen, Cerrado de Usina, Botucatu, São Paulo, Brazil)

Byrsonima intermedia (7 specimens, Fazenda Campininha, Mun. Mogi-Guaçu, São Paulo, Brazil)

Heteropterys umbellata Adr. Juss. (7 specimens, reared from flower buds, Belo Horizonte and Lagoa Santa, Minas Gerais, Brazil).

Distribution.— This species is known only from the type series from southern Brazil.

Specific Epithet.— The name of this species is based on the name of its type locality.

Anthonomus rosadoneto, new species

Type Series.— *Holotype*: Brazil, male [Rio de Janeiro/ Guanabara BRAZIL] [X-63] (MZSP). *Paratype*: Brazil, 1 female [Rio de Janeiro/ Guanabara BRAZIL] [X-63] (MZSP).

Recognition.— This species is distinguished by the following combination of characters:

- 1) male with broad, deep, setose pygidial sulcus;
- 2) female pygidium not sulcate;
- 3) aedeagus abruptly constricted subapically, with slight apical projection (Fig. 68);
- 4) endophallus with long, thin-walled tubular sclerites (Fig. 68);
- 5) elytral interspace 3 prominent at extreme base.

The only character distinguishing this species from *A. diamantinaensis*, aside from slight differences in the aedeagus (Figs. 67, 68), is the sulcate male pygidium. The female of *A. rosadoneto* is indistinguishable from that of *A. diamantinaensis*.

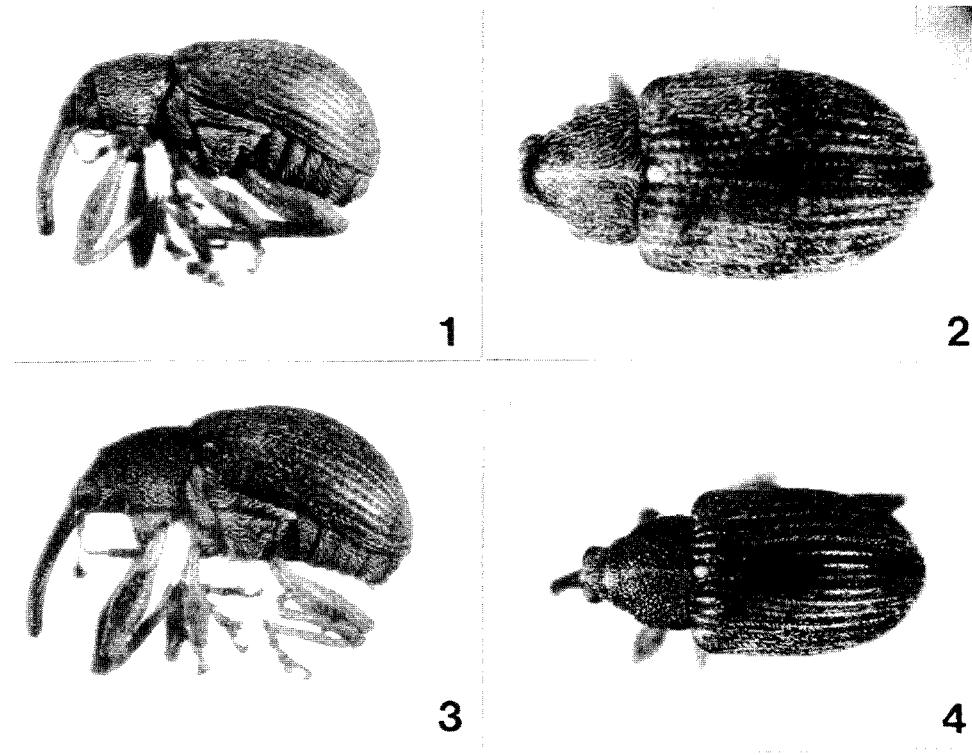
Description.— Male. *Length*: 2.2 mm (n=1). *Width*: 1.1 mm (n=1). *Head*: eyes separated by distance ca. 0.7 x width of rostrum at base. *Rostrum*: length 1.4 x (n=1) pronotal length; most strongly curved over antennal insertions; proximal portion strongly carinate, with broad, densely punctulate, shallow sulci; distal portion rugulose, length 26% (n=1) of total rostral length. *Thorax*: pronotum with elongate, narrow, aenescent scales and middorsal vitta of slightly broader whitish scales. *Pygidium*: median sulcus narrow, wider and deeper apically. *Legs*: profemur ca. 1.3 x stouter than metafemur, with obsolescent distal tooth; protibia with short, blunt preapical tooth; metatibial uncus minute, acute.

Female. *Length*: 2.4 mm (n=1). *Width*: 1.1 mm (n=1). *Rostrum*: short, stout, length 1.6 x (n=1) pronotal length; broadly, evenly curved; proximal portion deeply rugose, vestiture limited to extreme base; distal portion smooth, length 33% (n=1) of total rostral length. *Pygidium*: with broad, subquadrate, apicodorsal prominence. *Abdomen*: sternum 5 with posterior margin slightly produced medially.

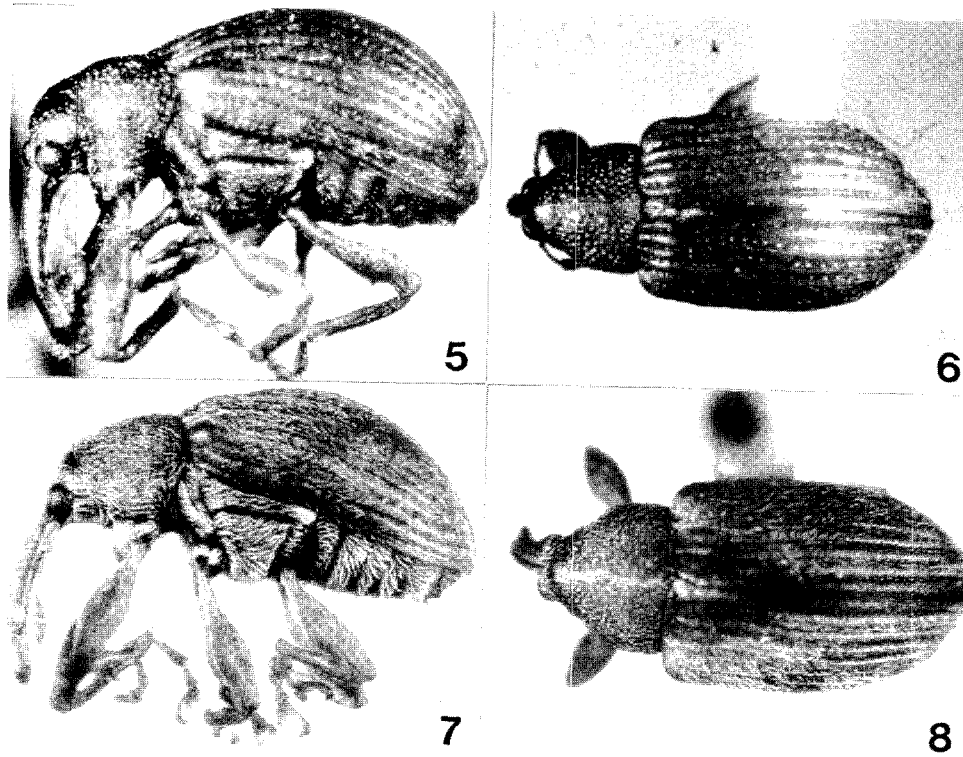
Plant Association.— Unknown.

Distribution.— This species is known only from the type series from southern Brazil.

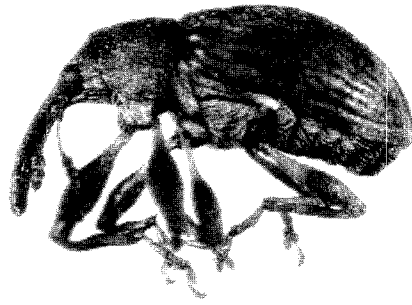
Specific Epithet.— This species is named for Germano H. Rosado-Neto of Curitiba, Brazil, in appreciation of his help and friendship.



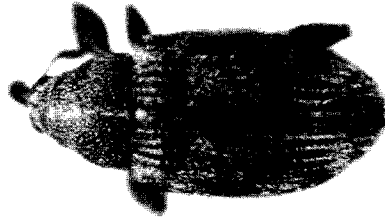
Figures 1-4. Habitus, dorsal and lateral views: 1, *A. rubidus*, male, Haddon Heights, New Jersey; 2, *A. rubidus*, male, Kappa, Illinois; 3 and 4, *A. bordoni*, male, Jaji, Venezuela.



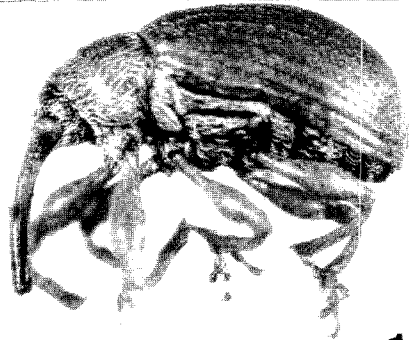
Figures 5–8. Habitus, dorsal and lateral views: 5, *A. profundus*, female, Trinity Co., California; 6, *A. profundus*, male, Ontario, Canada; 7 and 8, *A. galphimiae*, male, holotype.



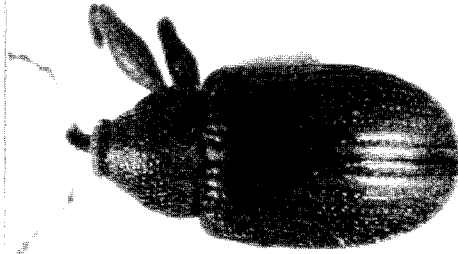
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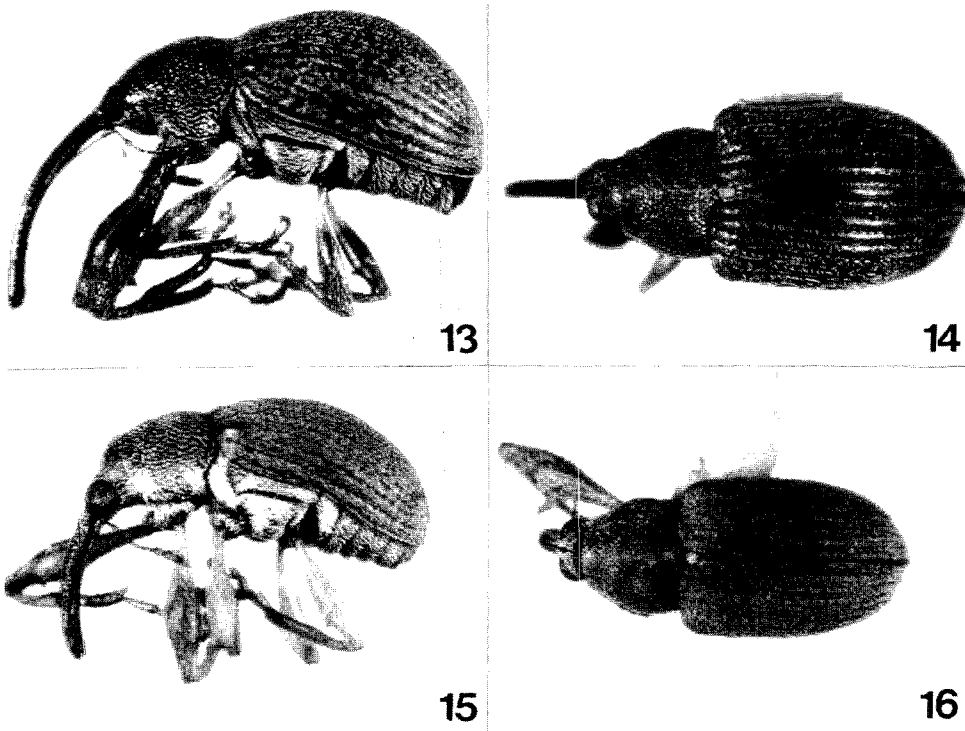


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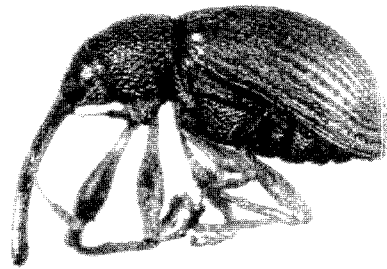


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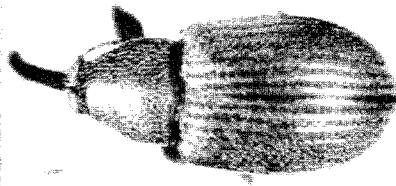
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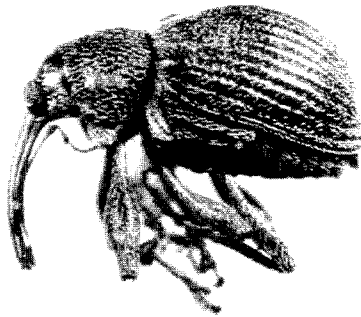
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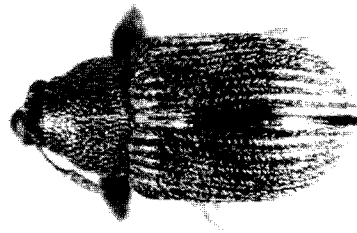
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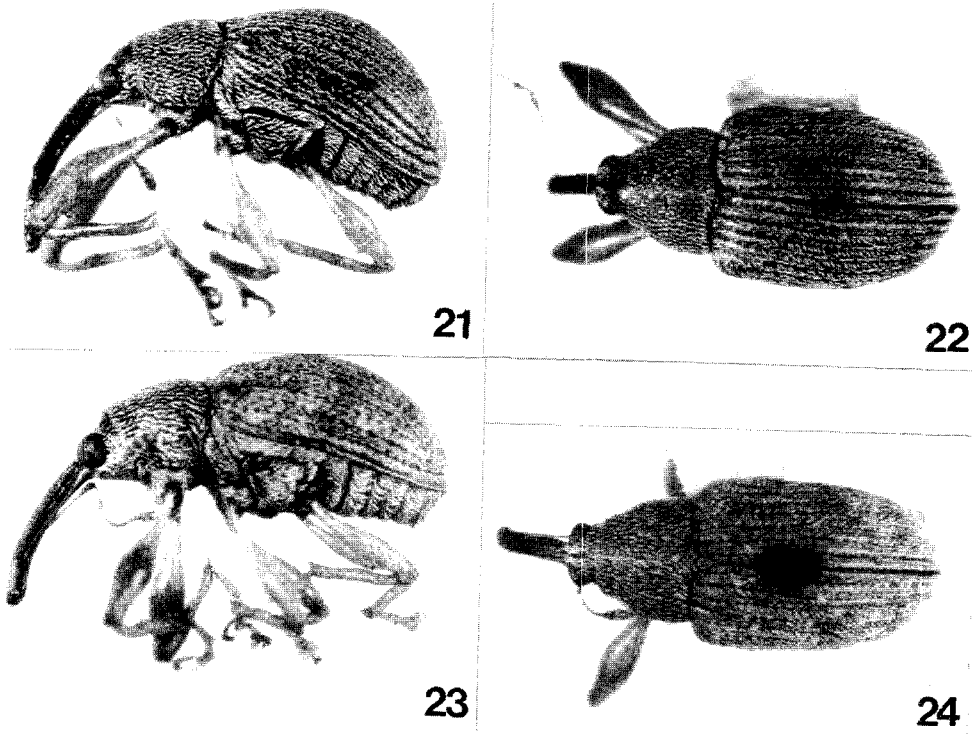


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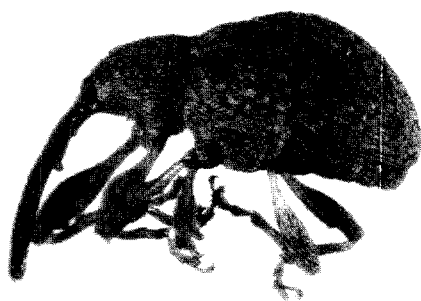


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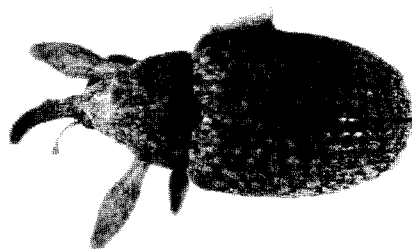
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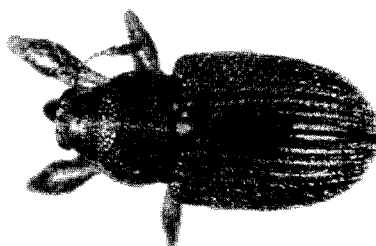
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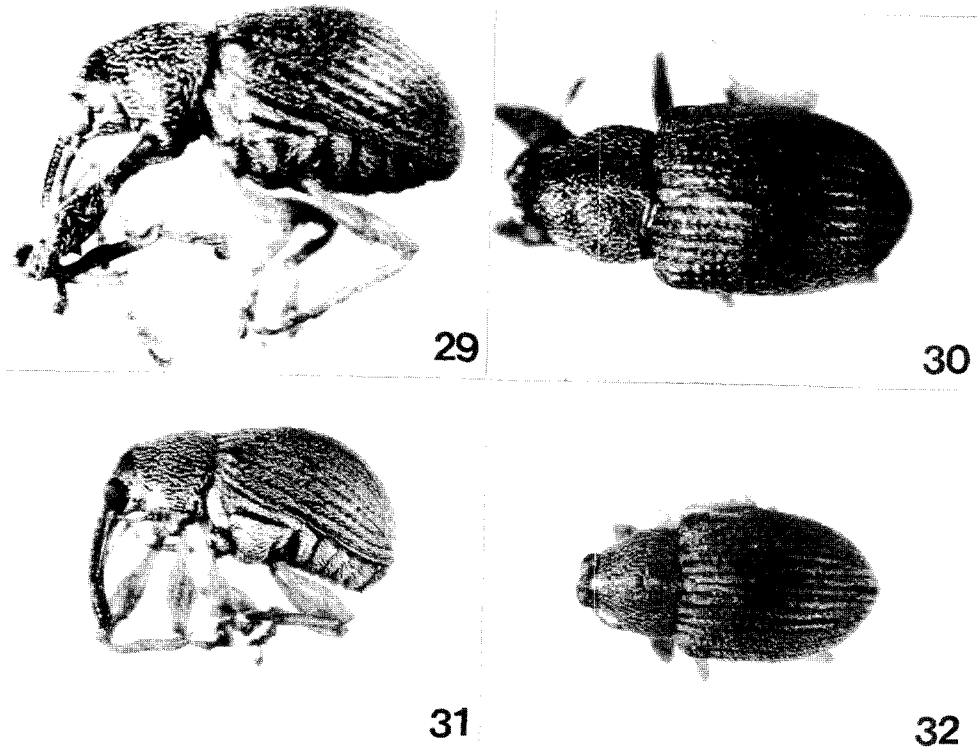


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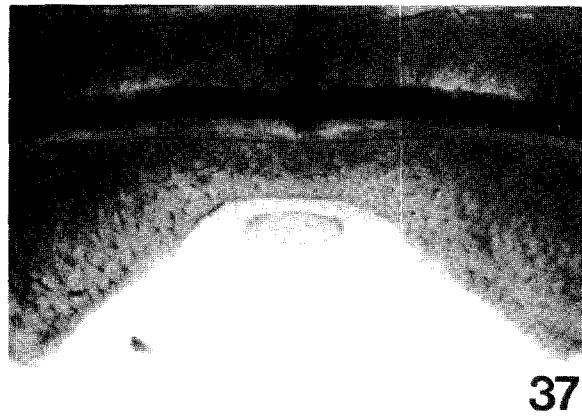
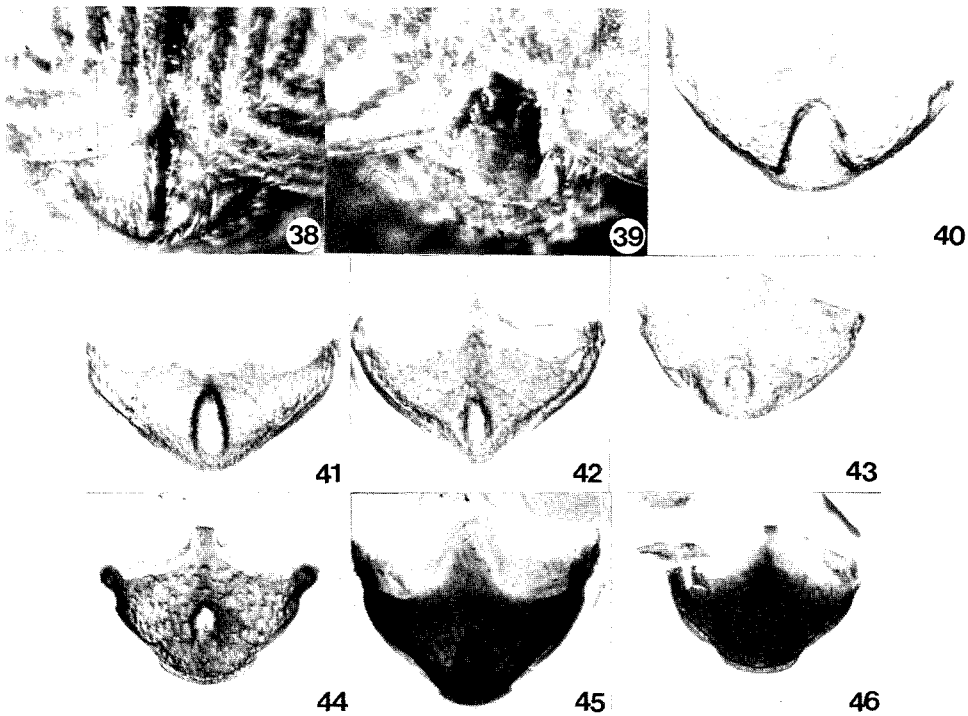
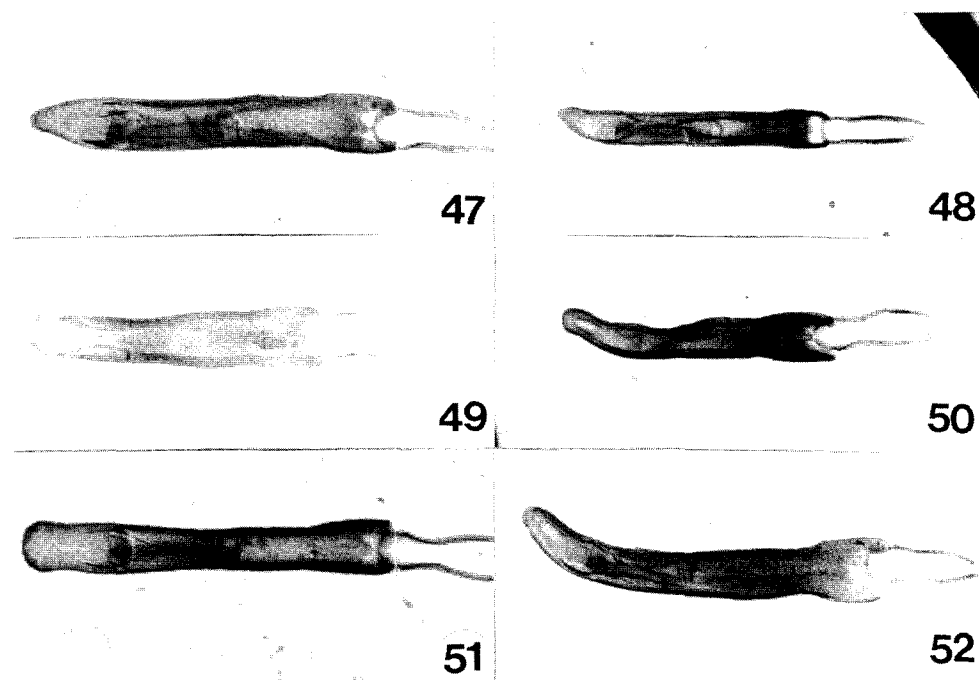


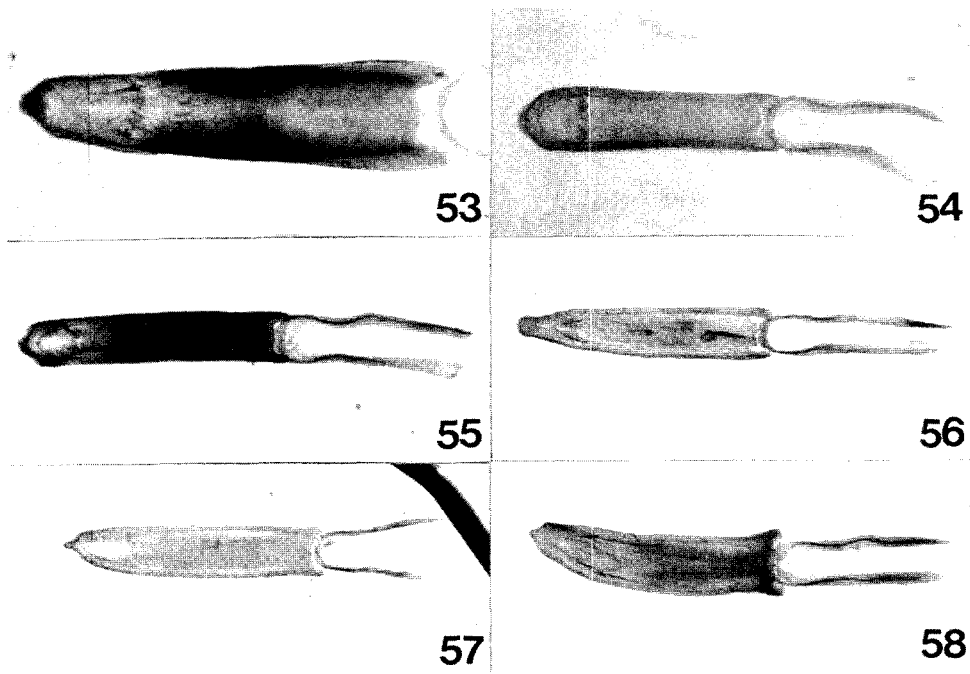
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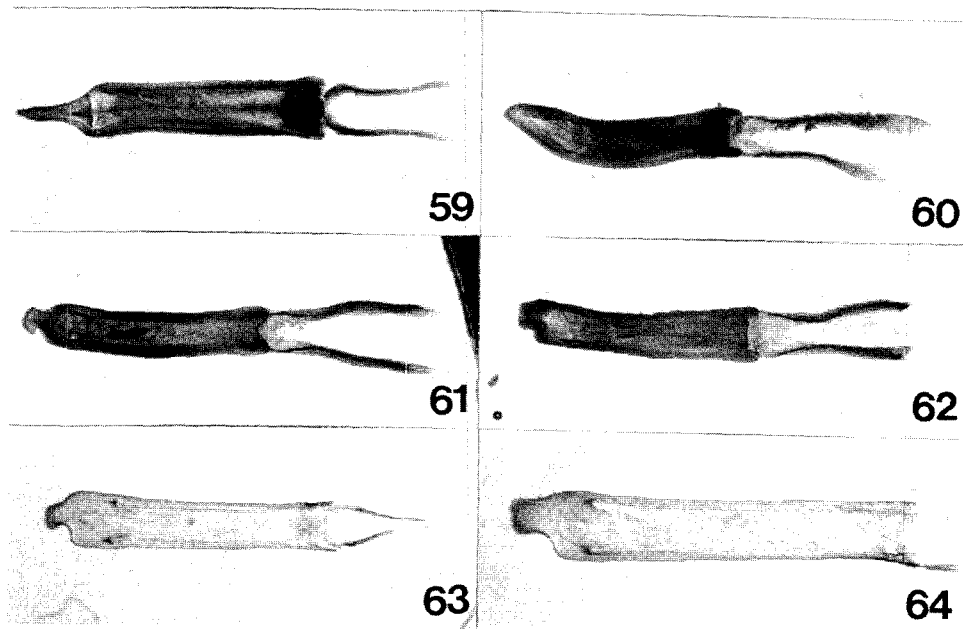
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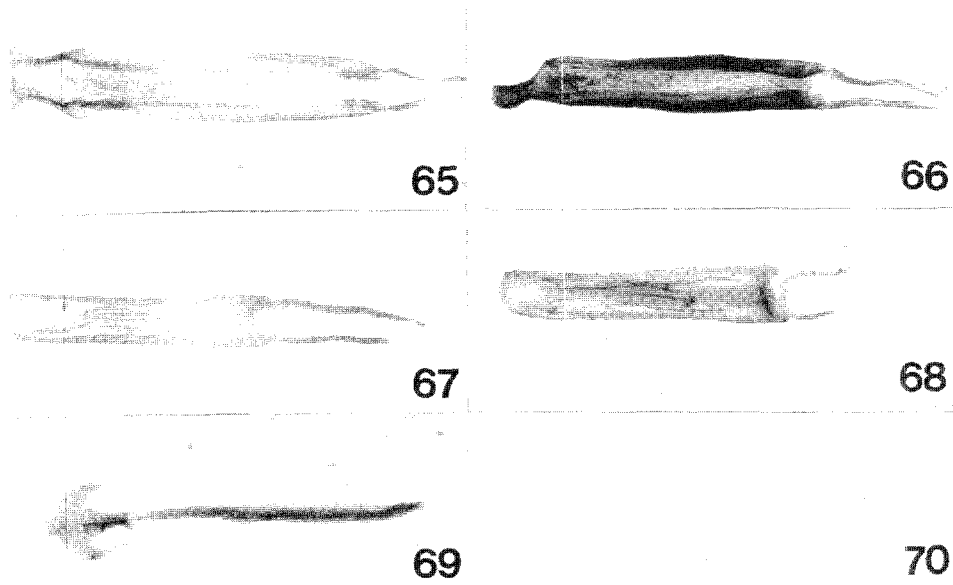
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PHYLOGENETIC RELATIONSHIPS

General Considerations

Phylogenetic relationships of the species of *Anthomorphus* were determined by comparing the distribution of morphological characters of the adult stage of each of the species. Twenty-seven of these characters (listed in Table 1) were determined to be apomorphic by comparison of the species of *Anthomorphus* with a hypothetical ancestral taxon. This taxon, or outgroup, was conceptualized after examination of numerous anthonomines, including members of the *grandis*, *gularis*, *unipustulatus* and *venustus* groups of the genus *Anthonomus* and the *Anthonomus* subgenus *Anthonomorphus* (see Clark, 1987 and Clark and Burke, 1985; 1986a, b.). The distribution of apomorphic characters (presence indicated by a score of "1," absence by a score of "0") among the 22 species of *Anthomorphus* is depicted in Table 2.

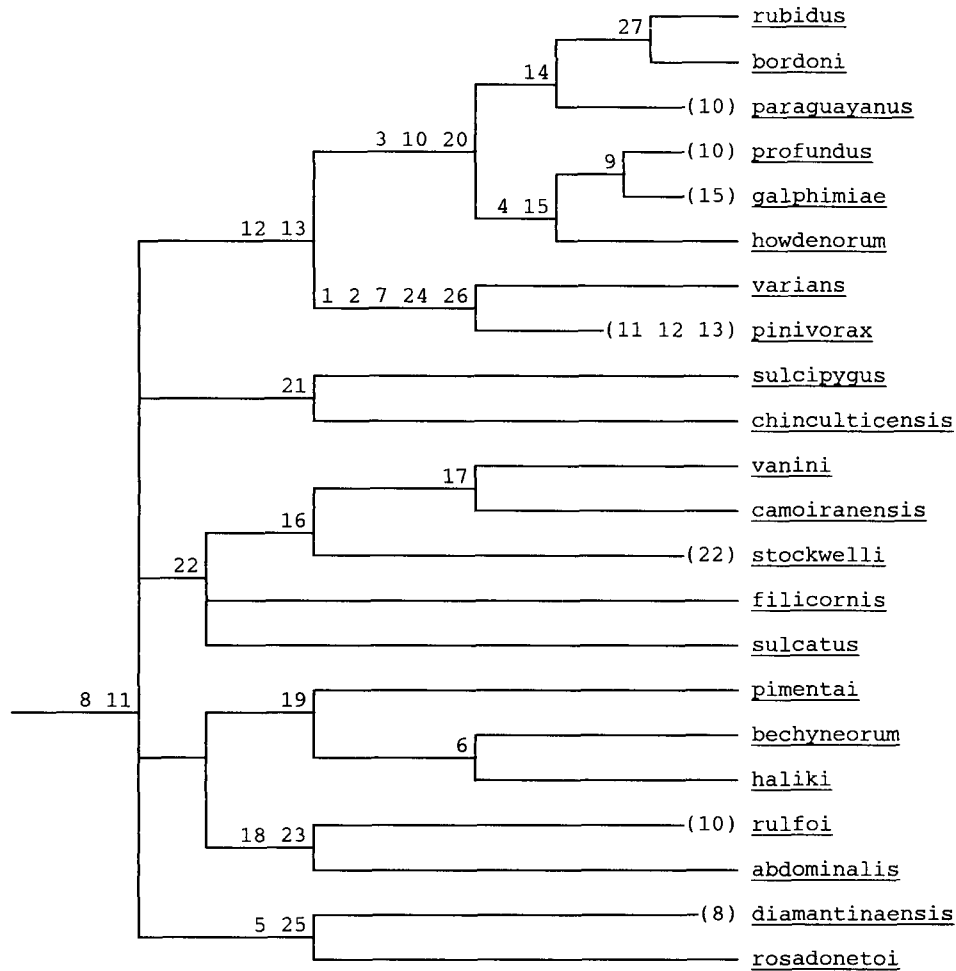
The characters were analyzed using the PAUP computer programs for the species consistent with the distribution of characters determined to be apomorphic, thus minimizing the number of required hypotheses of homoplasy. The result, compromised by weighting some characters to give a pattern only partly consistent with that produced by PAUP, is the phylogenetic tree depicted in Fig. 71.

The analyses are in three separate sets: 1) analyses of all species of *Anthomorphus* together; 2) separate analyses of the species assigned to the *rubidus* group; and 3) separate analyses of the species assigned to the *sulcatus* group. The same outgroup (lacking apomorphic characters, Table 2) was specified in each analysis. The three sets of analyses are discussed separately in the following paragraphs.

Analyses, set 1. These analyses provided the rationale for recognizing two species groups, a monophyletic *rubidus* group and a paraphyletic *sulcatus* group. An initial PAUP analysis considered all of the species of *Anthomorphus* with a unique set of apomorphic characters (*i.e.*, one each of each of pairs of taxa 6 and 15, 9 and 11, 10 and 19, and 13 and 18 in Table 2 was deleted from the analysis), using the MULPARS option. This analysis produced more than 100 equally parsimonious trees. A strict consensus tree derived from these trees indicated that the species assigned to the *rubidus* group, except for *A. varians* and *A. pinivorax*, belong to a single monophyletic group. A subsequent PAUP analysis (also using the MULPARS option) treated the same species as did the first, except that *A. pinivorax* (taxon 14) was excluded. The consensus tree derived from the trees produced by this analysis placed *A. varians* in the *rubidus* group at the position indicated in Fig. 71. The problematical *A. pinivorax* is depicted in Fig. 71 as the sister group of *A. varians* on the basis of synapomorphy in characters 1, 2, 7, 24, 26, even though subsequent PAUP analyses weighting these characters failed to move that species to the *rubidus* group.

Set 2, the *rubidus* group. As constructed by the analyses described as set 1, this group is justified on the basis of synapomorphous characters 12 and 13 (see Table 1). The species in this group (taxa 4, 12–14, 16, 18, 21 and 23) were subjected to a PAUP analysis using the ALLTREES option without weighting. This analysis produced a single tree with the topology depicted in the upper portion of Fig. 71.

The problems encountered in formulation of this group stem from the fact that *A. varians* and *A. pinivorax* seem to have diverged considerably from the New World stock from which they must have been derived. The greatest problem is that *A. pinivorax* does not exhibit the apomorphic characters (12 and 13) indicating monophyly of the group to which it is assigned. The problem is compounded by the absence in *A. pinivorax* of the emargination of sternum 5 of



XX characters
(XX) homoplasious characters

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Figure 71. Phylogenetic tree depicting hypothesized relationships of the species of *Anthomorphus*.

the male abdomen with the associated isolated triangular sclerite (apomorphic character 11), one of the characters considered to be synapomorphic in *Anthomorphus*. Furthermore, *A. varians* is autapomorphic for *Anthomorphus* in possession of simple tarsal claws. It is possible that *A. varians* and *A. pinivorax* are not sister species and that the apomorphic characters they share (1, 2, 7, 24 and 26) are due to convergence incidental to adaptation to similar host plants (both species are unusual among known anthonomines in having hosts in the family Pinaceae). It seems unlikely, however, that two independent host shifts involving relatively distantly related species would result in this unusual host association.

Set 3, the *sulcatus* group. A PAUP analysis was performed on the species assigned to the *sulcatus* group (taxa 2, 3, 5–10, 11, 15, 17, 19, 20, deleting one each of each of the redundant pairs of taxa 6 and 15, 9 and 11 and 10 and 19). This analysis also produced more than 100 equally parsimonious trees. The strict consensus tree derived from these trees was accepted in part. This tree indicated that *A. abdominalis*, *A. rulfoi*, *A. bechyneorum*, *A. haliki* and *A. pimentai* form a monophyletic group. This grouping was accepted even though there is no synapomorphy to support it. An analysis of these taxa to the exclusion of all of the others except the outgroup, using the ALLTREES option, produced three trees, the topology of one of which is produced as part of Fig. 71. The consensus tree also depicted *A. diamantinaensis* on a branch of its own as the sister group of all of the remainder of the *sulcatus* group. That species, however, is depicted in Fig. 71 as forming a monophyletic group with *A. rosadoneto* on the strength of shared possession of characters 5 and 25, of which the latter is considered the strongest evidence of the suggested relationship. This arrangement requires the assumption of the loss of character 8 in *A. diamantinaensis*. The consensus tree based on the trees produced in the initial analysis of all of the species of *Anthomorphus*, described above as “Set 1,” placed two of the species assigned to the *sulcatus* group, *A. sulcipygus* and *A. chinculticensis*, in the position of sister group to the *rubidus* group. There is no character evidence to support this and it is not incorporated into Fig. 71. Thus, the *sulcatus* group stands as an incompletely resolved paraphyletic group.

Further resolution of the phylogenetic relationships of the species in the *sulcatus* group cannot be made without additional characters. At this point it does not seem advisable to extend the character matrix to include additional adult morphological characters that probably would only add homoplasies.

ACKNOWLEDGMENTS

Thanks are extended to the individuals and institutions listed in the Materials and Methods Section for the loan of specimens used in this study. H.R. Burke initially suggested the group as suitable for revision and assisted in gathering literature and specimens. Host plants of some of the species (Malpighiaceae) were identified by William R. Anderson, University of Michigan. Special thanks are extended to R. Parentoni Martins and Hécio R. Pimenta, Universidade Federal de Minas Gerais, for assistance in collecting and rearing *Anthomorphus* and other anthonomines. Some specimens were collected by the author travelling with financial support from the “Biosystematics and Ecology of the Boll Weevil” research project, U.S. Department of Agriculture Broad Form Cooperative Agreement #12-14-7001-73 with Auburn University. H.R. Burke, G.W. Folkerts and M.C. Wooten provided critical review of the manuscript. This paper is published as Alabama Agriculture Experiment Station Journal Series No. 15-861105.

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Table 1. Apomorphic characters analyzed to produce phylogenetic tree in Fig. 71 (see Table 2)

-
- 1 Eyes small, round, prominent
 - 2 Rostrum slender, smooth, glabrous from base to tip
 - 3 Elytra with triangular basal macula
 - 4 Sutural elytral interspaces expanded subapically
 - 5 Elytral interspace 3 prominent at extreme base
 - 6 Elytral striae large, deep
 - 7 Scales on elytra sparse, setiform, whitish
 - 8 Pygidium of male sulcate
 - 9 Pygidium of female with sulcus broad, apical, posteriorly undelimited
 - 10 Metasternum and abdominal sterna of male with long setiform scales
 - 11 Sternum 5 of male abdomen emarginate, leaving setose, triangular sclerite isolated from posterior margin
 - 12 Basal portion of spiculum gastrale embracing median lobe, keeled ventrally
 - 13 Aedeagus with midventral, subbasal lobe
 - 14 Aedeagus with apical portion asymmetrical
 - 15 Aedeagus strongly asymmetrical
 - 16 Aedeagus expanded at extreme base
 - 17 Aedeagus with acute apicomedian projection
 - 18 Aedeagus narrowed to base, lateral plates thick
 - 19 Aedeagus with asymmetrical, medially emarginate, apical projection
 - 20 Endophallus with spinose proximal plate with s-shaped component, and with a more distal spine
 - 21 Endophallus with large distal spine and large serrate proximal spine
 - 22 Endophallus with small distal spines, a larger distal spine, and a ribbed plate
 - 23 Endophallus without denticles, with one small spine
 - 24 Endophallus unarmed
 - 25 Endophallus with long, thin-walled tubular sclerites
 - 26 Femora inflated
 - 27 Meso- and metafemora of male with long, ventral, setiform scales
-

Table 2. Data matrix for the phylogenetic tree in Fig. 71

		Characters
		0000000011111111122222222
		123456789012345678901234567
01	outgroup	000000000000000000000000
02	<i>abdominalis</i>	0000001001000001000010000
03	<i>rosadoneto</i>	00001001001000000000000100
04	<i>howdenorum</i>	001100010111101000010000000
05	<i>rulfoi</i>	0000001011000001000010000
06	<i>bechyneorum</i>	0000101001000000010000000
07	<i>stockwelli</i>	0000001001000010000000000
08	<i>diamantinaensis</i>	00001000010000000000000100
09	<i>camoiranensis</i>	00000010010000110000100000
10	<i>filicornis</i>	0000001001000000000100000
11	<i>vanini</i>	00000010010000110000100000
12	<i>paraguayanus</i>	001000010011110000010000000
13	<i>bordoni</i>	001000010111110000010000001
14	<i>pinivorax</i>	110000110000000000000001010
15	<i>haliki</i>	000001010010000000100000000
16	<i>profundus</i>	001100011011101000010000000
17	<i>chinculticensis</i>	000000010010000000001000000
18	<i>rubidus</i>	001000010111110000010000001
19	<i>sulcatus</i>	000000010010000000000100000
20	<i>sulcipygus</i>	000000010010000000001000000
21	<i>varians</i>	110000110011100000000001010
22	<i>pimentai</i>	000000010010000000100000000
23	<i>galphimiae</i>	001100011111100000010000000

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