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Weevils of the Tribe Sivalini (Coleoptera, Curculionidae, Rhynchophorinae) Part 1. The Genera *Rhinostomus* and *Yuccaborus*

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INTRODUCTION

The present paper is a revision of the genera *Rhinostomus* and *Yuccaborus*, and is the first of a series on the weevil tribe Sivalini. The other genera, *Mesocordylus*, *Orthognathus*, and *Sipalinus* will be treated in a subsequent paper.

Although these weevils have no metallic scales and are not brilliantly colored as are many other tropical Curculionidae, they are often handsomely patterned. Some are black with opaque white stripes or spots; some have rows of large or small yellowish spots, and some are brown with white spots interspersed with deep brown, velvety markings. None of the species is smaller than 5 mm., and the majority are more than 12 mm. in length. The mandibles are devoid of pincers or denticles on the inner, biting surface, an unusual, but not unique, condition among the Curculionidae.

The species are found chiefly in the tropics of the New and Old World (table 1). Some breed in *Yucca* plants, some in various palms and palmettos or other trees, such as the baobab, but usually only in dead, damaged, or fallen trees. Except for the ecology of *Rhinostomus barbiros-*

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tris, the well-known coconut palm weevil, and for *R. niger*, little has been published on the habits of the species. At least some species are known to be nocturnal. A species from the Lesser Antilles has wings too short for flight, but other species from islands in both hemispheres are fully winged.

There are some bizarre members of the Sivalini. Thus, in the male of *R. barbirostris*, the very long, straight, outstretched dorsally dentate beak resembles a bottle brush with abundant, reddish gold hairs spring-

TABLE 1
DISTRIBUTION OF GENERA OF THE SIPALINI

	<i>Rhinostomus</i> 7 species	<i>Yuccaborus</i> 1 species	<i>Mesocordylus</i> 24 species	<i>Orthognathus</i> 3 species	<i>Sipalinus</i> ? species
South America	3	—	17	2	—
Antilles	2	—	3	—	—
Central America	1	—	8	1	—
Mexico	1	1	2	1	—
United States	—	1	—	1	—
Tropical Africa	1	—	—	—	4
Eastern Eurasia	—	—	—	—	?
Australasia	1	—	—	—	?

ing out from all sides. In addition there are reddish gold hairs on the prothorax, and the front legs of males of a number of species are very long or hairy or dentate. *Rhinostomus barbirostris* is probably the third largest weevil in the world, being surpassed in the same subfamily by *Protocerius collossus* Olivier from Australasia (60 mm., excluding the beak), and *Rhynchodynamis filirostris* Heller from South America, which was cited by Wattanapongsiri (1966), as being 52 mm. in length, excluding the beak. In other genera of the Sivalini, the beak of one species is flattened and spatulate like that of the duckbilled platypus; in another species the male has two pendant "dewlaps" under the beak; in some species the tarsi or tibiae or the antennal club are modified in unusual ways.

The only previous survey of the tribe was made by Lacordaire (1866). In it he included six genera, gave descriptions and diagnoses of the tribe and the genera, and an enumeration of the species.

ACKNOWLEDGMENTS

The revision of the tribe Sivalini could not have been completed with-

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As many types as possible were examined. Dr. Per Inge Persson of the Naturhistoriska Riksmuseum, Stockholm, was kind enough to send the important older types of Boheman, Chevrolat, and Fahraeus; Dr. Manuel J. Viana of the Museo Argentino de Ciencias Naturales, Buenos Aires, the type of *Mesocordylus breyeri* Brethes; Dr. J. C. Husing of the Martin-Luther-Universität, Halle-Wittenberg, Germany, the types of *Sipalus cylindraceus* Boheman and *subulatus* Germar; Mr. R. T. Thompson of the British Museum (Natural History), the type of *Mesocordylus gracilis* Champion; and Dr. Sampurno Kardasan of the Museum Zoologicum Bogoriense, Java, the type of *Harpacterus orientalis* Günther. For the loan of the last-named type I am grateful also to Drs. R. Hertel of Dresden, C. A. W. Jeckel of Amsterdam, and M. A. Lieftinck of Leiden, who were instrumental in locating this specimen.

Comparisons of specimens in the American Museum of Natural History with the types in other institutions were made for me by Mr. R. T. Thompson, British Museum (Natural History); Dr. J. F. Lawrence, Museum of Comparative Zoology; and Rose Ella Warner, United States National Museum, Smithsonian Institution. Dr. S. G. Larsson of Copenhagen compared two of Fabricius' types.

A number of individuals lent me specimens from their collections: Dr. Carlos Bordon A., Caracas, Venezuela; Padre Pio J. Buck, Porto Alegre, Brazil; Dr. C. A. Campos Seabra, Rio de Janeiro, Brazil; Dr. and Mrs. Henry F. Howden, Ottawa, Canada; Dr. David G. Kissinger, South Lancaster, Massachusetts; Dr. Charles W. O'Brien, University of California at Berkeley; Dr. David Rockefeller, New York, N. Y.; Dr. Elbert L. Sleeper, Long Beach, California; and Dr. Barry D. Valentine, Columbus, Ohio.

For lending me specimens I wish to thank various institutions and the persons in charge of the collections: Atlantic Union College, South Lancaster, Massachusetts, Dr. David G. Kissinger; British Museum (Natural History), Mr. R. T. Thompson; California Academy of Sciences, San Francisco, Mr. Hugh B. Leech; Canadian National Collection, Ottawa, Dr. Henry F. Howden; Departamento de Zoologia, São Paulo, Dr. Hans Reichardt; Field Museum of Natural History, Chicago. Dr. Rupert L. Wenzel; Museum of Comparative Zoology, Cambridge, Massachusetts,



FIG. 1. Distribution of the tribe Sipalini.

Dr. John F. Lawrence; Muséum National d'Histoire Naturelle, Paris, Dr. A. M. Villiers; Museum of Zoology, University of Michigan, Ann Arbor, Dr. Richard D. Alexander; Ohio State University, Columbus, Dr. Charles A. Triplehorn; Staatliches Museum für Tierkunde, Dresden, Dr. Rolf Hertel; Texas Agricultural and Mechanical College, College Station, Dr. Horace R. Burke; United States National Museum, Smithsonian Institution, Washington, D. C., Miss Rose Ella Warner; Zoologisches Museum, Berlin, Dr. F. Hieke; Zoologisches Sammlung des Bayerischen Staates, Munich, Dr. Heinz Freude. The museums in Berlin; Cambridge, Massachusetts; Chicago; London; Ann Arbor, Michigan; Paris, and Stockholm were visited, as were the Universitetets Zoologiske Museum, Copenhagen, and the Zoological Institute of the Academy of Sciences, Leningrad.

HISTORY OF THE TRIBE

The first species of the tribe was described by Drury (1773) as *Curculio niger* (now *Rhinostomus*). The first genus described was *Rhina* Latreille (1802), a name found later to be preoccupied. The other genera were described by Schoenherr in 1826, 1838, and 1845, by Lacordaire in 1866, and by LeConte in 1876.

Schoenherr (1838) divided his Rhynchophorides into subdivisions, of which the Cryptopygi included *Rhina*, *Sipalus*, *Orthognathus*, and *Stromboscerus*. Lacordaire (1866) was the first to bring the genera together into a tribe which he called the Sivalides. This name was emended to Sivalini by Hustache (1924), and has been used subsequently in the catalogues of Csiki (1936) and Blackwelder (1947). *Stromboscerus* was removed to another tribe by Lacordaire (*loc. cit.*), who then divided the six genera of his Sivalides into three groups: the Orthognathides, the true Sivalides, and the Sclerocardides. The last-named group, which included only one genus (*Sclerocardius* Schoenherr) with two species from the Eastern Hemisphere, was transferred by Marshall (1935) to the subfamily Cryptorhynchinae near *Ithyporus*. *Sclerocardius* is said to differ from the Sivalini chiefly by having seven instead of six segments in the funiculus of the antenna, also by having the mandibles pincer-like, and the prosternum canaliculate for the reception of the beak. With *Sclerocardius* excluded, the five remaining genera of a hundred years ago are today still considered as belonging in the same tribe. Lacordaire's first group included one genus (*Orthognathus*), and his true Sivalides included the others (*Sipalus*, *Mesocordylus*, *Harpacterus*, and *Rhina*). *Yuccaborus* was described ten years later by LeConte (1876).

Three additional genera were listed in this tribe by Csiki (1936). I

have not seen these genera, but probably they do not belong in the Sivalini. One of them, the monotypic *Bastaphorus* Fairmaire (Africa), was transferred by Marshall (1935) to the subfamily Amalactinae, where it was synonymized with *Aorus* Schoenherr. *Anius* Pascoe and *Tasactes* Faust (Sumatra, Java, Borneo, China), which include four small species (4 to 6 mm.) were considered by Faust (1894) and Voss (1940, for *Anius*) to be in the tribe Sivalini. Anderson (1948), however, in evaluating larval characters from the literature, found *Anius* not closely related to the Sivalini, but rather to the Stromboscerini, which he elevated to the subfamily Stromboscerinae. *Tasactes*, according to the description, differs from the Sivalini by having the eyes separated and not contiguous below. It would be instructive to know what kind of mouth parts these genera have, as those of the Sivalini are quite characteristic (see below).

Since the time of Lacordaire, there has been no inclusive account of all the genera. LeConte (1876), Casey (1892), Champion (1910), Hustache (1924), and Voss (1958) reviewed genera of certain regions only, and Lepesme (1947) revised one genus.

CHARACTERS OF THE TRIBE

The genera, according to Lacordaire (1866), are united by two characters: the terminal mouth parts in which the buccal organs are generally hidden both by the mandibles and by the ventral plate of the rostrum, and from which the peduncle of the postmentum has disappeared; and the elbowed or geniculate antennae. If one adds to the above that the mandibles are not pincer-like but have smooth inner surfaces, that the funiculus of the antenna is six segmented, and that the pygidium is covered by the elytra, there should be no mistaking the genera of this tribe. The four other tribes of the Rhynchophorinae (Csiki, 1936) differ from the Sivalini as follows: the Campyloscelini and the Rhynchophorini have the pygidium exposed beyond the elytra, the Stromboscerini have pincer-like mandibles, and the Cryptodermini have straight antennae.

A summary of the characters shared by the genera are: Mandibles not clasping or pincer-like. Eyes large, coarsely granulate, elongate-oval, depressed, contiguous below. Antennae with sparse, short setae, scape at least as long as first three segments of funiculus; funiculus six-segmented; club two-segmented, with horny or corneous base and spongy apex. Elytra punctate-striate, almost entirely covering pygidium. Prosternum not channeled. Mesepimeron ascending angularly (fig. 2). Metepimeron covered by sides of elytra and generally not visible. Metasternum at base longitudinally impressed. Femora unarmed. Tibiae

apically uncinata. Tarsal claws free, simple, at base widely separated. Eighth tergum at base not margined, not completely sclerotized, that of female (fig. 46) without apical impression. Aedeagus (except in *Rhinostomus*) with lateral line dividing dorsal and ventral surfaces.

The unusual structure of the mandibles deserves further discussion. In the first place, there are other genera in different subfamilies in which the mandibles are also devoid of teeth on their inner surfaces. Kissinger (1964, p. 2, and in a letter) mentioned *Curculio*, *Erodiscus*, and some Baridinae, as *Geraeus* and relatives. Ting (1936, p. 98) cited *Tachygonus* and *Otidognathus*. Lacordaire (1866, p. 270) and Günther (1938, p. 45) mentioned genera from Eurasia and Australasia (*Otidognathus*, *Macrocheirus*, *Cyrtotrachelus*, and *Protocerus*), which are in the same subfamily as the Sipalini, but in the tribe Rhynchophorini. Wattanapongsiri (1966, p. 303) illustrated *Dynamis* and *Rhynchodynamis*, also of the Rhynchophorini, as having no inner teeth. With these examples so widely separated in the classification, it is difficult to say what, if any, phylogenetic significance this type of mandible has. It may be an adaptation to food-getting or ovipositing. Those species of the Sipalini whose habits are partially known are associated with damaged or fallen trees, most of which are monocotyledons. Kissinger (in a letter) wrote that "weevils with these odd-shaped mandibles feed either on monocots with stringy fibrous stems or else in other plants with a fibrous condition." The species of *Yuccaborus* and *Rhinostomus*, which breed in *Yucca* plants and in various palms, have the same kind of mandible (figs. 3, 6).

In these genera the three lateral teeth or lobes of each mandible turn outward away from each other so that they never come into contact; they are convex on the inner surface and concave on the outer. The mandibles of the oriental genera mentioned above are also of this type. Kissinger believed that these mandibles may "function by cutting or ripping through fibrous material essentially to punch a hole for oviposition . . . the tip of the beak with the mandibles shut could be easily shoved down to the bottom of a hole . . . when the mandibles are opened, either they may rip through additional fibers enlarging the hole . . . or the resistance of the fibers may enable the mandibles to shove the tip of the beak deeper, something like a breast stroke when a person is swimming under water." The projecting, acuminate ventral plate of the beak (visible from above when the mandibles are slightly open) may serve further, Kissinger suggests, as an effective punch. He mentions that in *Geraeus* the mandible is used to punch a hole through a grass stem in preparation for oviposition.

The mandibles of the three other genera of the Sipalini differ slightly

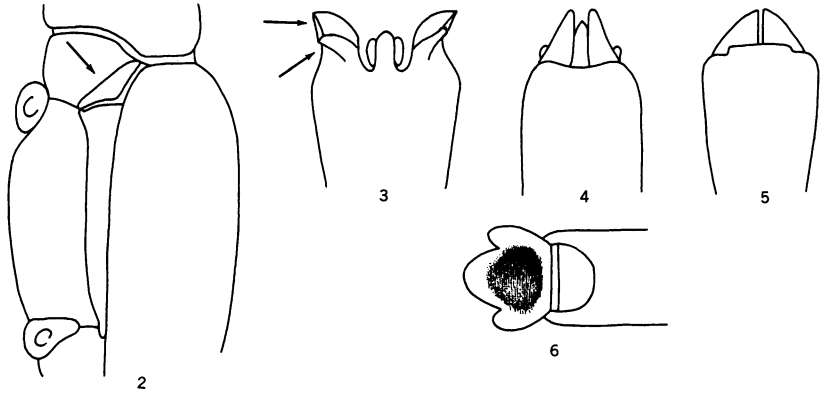


FIG. 2. *Yuccaborus frontalis sharpi*, showing mesepimeron ascending.

FIGS. 3-5. Mandibles, dorsal view. 3. *Rhinostomus* and *Yuccaborus*. 4. *Mesocordylus*. 5. *Sipalinus*.

FIG. 6. Mandibles, lateral view, of *Rhinostomus* and *Yuccaborus*, showing dark, concave area.

from those of *Yuccaborus* and *Rhinostomus* and from one another. Those of *Sipalinus* and *Orthognathus* are apparently devoid of teeth on any surface; viewed dorsally, those of *Sipalinus* (fig. 5) are broadly triangular, whereas those of *Orthognathus* are elongate, like stubby fingers. The mandibles of *Sipalinus* may actually have a cutting edge on the inner surface and possibly work as a wire cutter instead of as a punch. When shut, they are closely opposed and appear thinner and more knifelike than the thick mandibles of *Orthognathus*. In *Mesocordylus*, the mandibles are elongate-triangular (fig. 4), whether viewed dorsally or laterally, and in addition they have two tiny, basal teeth, one on the upper, one on the lower, margin, these teeth being generally visible in a lateral view if not abraded; there may also be some lateral denticles. Kissinger believed that the effective cutting edge here may be between the mandible and the basal tooth and that perhaps the latter might serve to prevent fibers from slipping off the effective edge.

RELATIONSHIPS OF THE GENERA

The five genera recognized in the present series are separable into either two or three groups. The first group (*Rhinostomus* and *Yuccaborus*) is characterized by having thick, outward curving mandibles, trilobed laterally; dilated, bilobed third tarsal segments; dentate tibiae on at least one pair of legs (except in one species); longer antennal scape; and

no postocular lobe on the pronotum. The second group (*Mesocordylus* and *Orthognathus*), as well as the third (*Sipalinus*), is characterized by having porrect, subtriangular mandibles, with or without basal teeth; narrow, linear third tarsal segments; nondentate tibiae; shorter antennal scape, and a postocular lobe. The third group can be considered by itself, not only because of the structure of the mandible mentioned above, but also because its species are restricted in distribution to the Old World. There is evidently also a difference in the larvae. Anderson (1948, p. 416), in his studies of the larvae of the Rhynchophorinae, wrote that "it is evident that *Sipalus* [*Sipalinus*], *Rhinostomus* and *Yuccaborus* form a natural, compact group," but that the larvae of *Sipalinus hypocrita* (Boheman), as described by Gardner (1934), was separable from the larvae of the other two genera by having two pairs of processes on the posterior margin of the ninth abdominal segment instead of only one pair. Relationships between the second and third groups will be discussed in a subsequent paper.

The single species of *Yuccaborus* resembles species of *Sipalinus*, *Orthognathus*, and *Mesocordylus* in the widely separated eyes, but is otherwise similar to *Rhinostomus*, not only in shape, but in the mandibles, the straight beak, and the absence of a postocular lobe. In fact, it could conceivably be synonymized with *Rhinostomus*, but it differs in being more northern in distribution, by having a different family of host plants (Liliaceae as opposed to Palmaceae), by having the eyes widely separated above, the apex and under surface of the third tarsal segment hairy at the apex only, and the middle tibia denticulate at the apex. *Rhinostomus*, on the other hand, differs from all the genera by having the eyes virtually contiguous above, and no lateral line on the aedeagus. Five of its seven species differ further from those of the other genera in their widely spaced, not contiguous, front coxae.

KEY TO THE GENERA OF THE SIPALINI

1. Eyes above virtually contiguous or separated by no more than width of base of antennal scape; pronotum without postocular lobe (Old and New world) *Rhinostomus*
 Eyes above widely distant, separated by width of base of beak; pronotum with or without postocular lobe 2
2. Pronotum without postocular lobe; third tarsal segment deeply bilobed and wider than preceding segments (New World) *Yuccaborus*
 Pronotum with strong or feeble postocular lobe; third tarsal segment not bilobed, not wider than preceding segments 3
3. Old World only; each mandible, viewed dorsally, at base at least as wide as long (fig. 5); dull, not shining, covered with brown or grayish coating, elytra (unless greased to black) mottled with whitish tubercles and

- darker brown, velvety patches *Sipalinus*¹
- New World only; each mandible, viewed dorsally, longer than wide (fig. 4); dull or shining, black or piceous, with or without brownish yellow, opaque or glossy coating or whitish elytral spots 4
4. Hind tibia scarcely, if at all, wider at apex than at base, its apical truncation, if visible in profile view, narrow, not wider than second tarsal segment; beak dorsally smooth or with single faint carina *Mesocordylus*¹
- Hind tibia abruptly widened to apex where at least twice width of base, its apical truncation widely visible, wider than second tarsal segment; beak dorsally bi-carinate or multi-carinate *Orthognathus*¹

CHECKLIST OF SPECIES OF *Rhinostomus* AND *Yuccaborus*, WITH SYNONYMSGENUS *RHINOSTOMUS* RAFINESQUE

- barbirostris* (Fabricius)
validus (Panzer)
verrirostris (Illiger)
ebriosa (Fahraeus)
costalis (Fahraeus)
affaber (Fahraeus)
niger (Drury)
afzelii (Fahraeus), new synonymy
ampliocollis (Gerstaecker)
oblitus (Jacquelin-Duval)
scrutator (Olivier)
meldolae (Pascoe)
lineata (Desbrochers des Loges)
orientalis (Günther), new synonymy
quadrisignatus (Boheman)
ebeninus (Boheman), new synonymy
thompsoni, new species

GENUS *YUCCABORUS* LECONTE

- frontalis frontalis* (LeConte)
grossus Casey, new synonymy
frontalis sharpi Casey
lentiginosus Casey, new synonymy

GENUS *RHINOSTOMUS* RAFINESQUE

Rhinostomus RAFINESQUE, 1815, p. 115, new name for *Rhina* LATREILLE, 1802, preoccupied by *Rhina* SCHNEIDER, 1801 (Pisces). Type of *Rhinostomus*, *Curculio barbirostris* Fabricius, 1775, by designation under Plenary Powers of International Commission on Zoological Nomenclature, 1955.

Harpacterus SCHOENHERR, 1845, p. 206. Type, by original designation, *Harpacterus quadrisignatus* Boheman, 1845. New synonymy.

DIAGNOSIS: Differing from other genera of tribe by having eyes vir-

¹ This genus is discussed in the second part of the series.

tually contiguous above, separated by not more than width at base of antennal scape. Resembling *Yuccaborus* and differing from remaining genera by having mandibles laterally trilobed and curving outward, third tarsal segment bilobed, even if shallowly, and wider than other segments, and no postocular lobe on pronotum.

DESCRIPTION OF GENUS: (Characters of tribe not repeated) Length, excluding beak, from 10 to 40 mm., beak from 4 to 18 mm. Color black or black with elytra furnished with white or yellowish spots, stripes, or patches of opaque glaze or coating. Sexes differing greatly (see sexual dimorphism below).

Eyes nearly contiguous above. Mandibles, viewed from above, curving outward, showing palpi within (fig. 3), laterally trilobed, lobes on inner surface convex, on outer concave. Beak straight, slightly wider or taller over antennal insertion, its dorsal apex between mandibles projecting upward, or triangular, truncate, or emarginate; scrobe short or long, linear, descending obliquely or abruptly backward to lower edge of beak. Antenna, club either elongate-oval (about twice as long as wide), or elongate (from two to four times longer than wide), compressed or subcylindrical, its apical spongy part varying from one-half to three-fourths or more of length of club; scape widened at apex, as long as or longer than funiculus; second funicular segment longer than third; segments three to six elongate or transverse.

Pronotum, postocular lobe absent; base strongly margined. Scutellum triangular, with wide base and blunt apex. Elytra at least one and one-half times length of pronotum, subcylindrical. Coxae strongly punctate, hairy; narrowly or widely separated. Abdomen with suture between first and second segments straight.

Front femur and tibia much longer than those of other legs (but only slightly longer in *quadrisignatus* and *thompsoni*). Tibiae and femora linear, at least one pair of tibiae dentate or denticulate on inner edge (except in *thompsoni*), middle tibia on outer edge more or less carinate. Tarsi almost as long as tibiae; all tarsal segments with ventral surface hairy, third segment either widely dilated and deeply bilobed or less dilated and shallowly bilobed. Aedeagus without lateral line dividing dorsal and ventral surfaces, or with it vaguely present at base only; with two long appendages or apodemes attached dorsally to base of aedeagus. Eighth tergum of male at apex rounded-truncate, densely hairy. Genitalia of female as in figures 45-47.

SEXUAL DIMORPHISM: In all species the beak of the male in its apical half is flattened and is dorsally medially carinate, whereas the beak of the female is smooth and convex in the same area. In the majority of

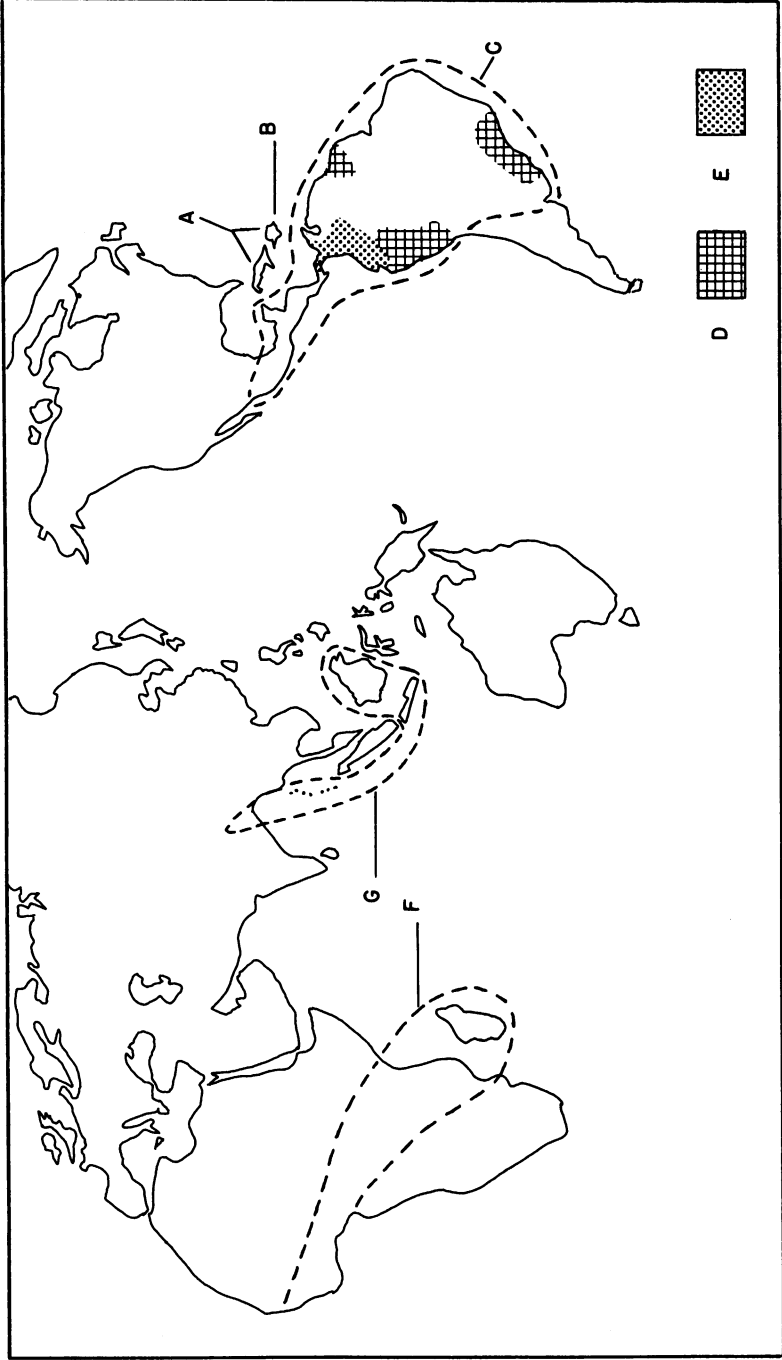


FIG. 7. Distribution of the species of *Rhinostomus*. A. *R. obtitus*. B. *R. scrutator*. C. *R. barbivostris*. D. *R. quadrisignatus*. E. *R. thompsoni*. F. *R. niger*. G. *R. meloblae*.

species, however, the front of the beak of the male is covered with long hairs which obscure the surface. The males of all species except *quadrisignatus* and *thompsoni* differ from the females by having a much longer beak with two rows of dentations on top from the base to the apex, longer front legs, and a great abundance of long, golden or reddish hairs spreading out from all sides of the beak and from parts of the prothorax. In *quadrisignatus* and *thompsoni* the beak of the male is only slightly longer than that of the female and it is generally less tumid over the antennal insertion. In all species the antennae of the male are inserted farther toward the front of the beak than those of the female. In the males of four species (*niger*, *oblitus*, *scrutator*, and *meldolae*) the front tibia on the inner edge is abundantly ciliate, and in the male of *oblitus* and *scrutator*, the front tarsus is also strongly ciliate on all sides. Females have only short, inconspicuous hairs on the legs and virtually no dentations on the beak, although females of *barbirostris* and *niger* have tubercles on the beak. Males of some species have rather incurved or slightly sinuate front tibia, and the male of *meldolae* has very strongly sinuate front tibia (fig. 9).

DISTRIBUTION AND ECOLOGY: As shown on the map (fig. 7), four of the species are chiefly continental and three chiefly insular. Two of the continental species are widespread, *niger* occurring throughout tropical Africa, as well as on Madagascar, and the Comoro Islands, and *barbirostris* throughout South America except for Chile, and extending northward into Central America and southern Mexico. The other two (*quadrisignatus* and *thompsoni*) are more restricted in their distribution in South America and do not occur north of Panama. All three species of South America are found in Ecuador; *barbirostris* and *quadrisignatus* are found together in Brazil, French Guiana, and Peru, and *barbirostris* and *thompsoni* in Colombia.

One of the island species (*meldolae*) occurs in Australasia (Java, Borneo, the Andaman Islands, and possibly India), the other two, in the Greater Antilles, *oblitus* in Cuba, and both it and *scrutator* in Haiti, but only in the eastern, Dominican, half. The species from Cuba has been recorded from Haiti (five of 177 specimens), but the reverse is not true, as *scrutator* does not occur in Cuba.

The species on which there is some biological information (*barbirostris*, *niger*, *oblitus*, and *scrutator*) live at the expense of palms, notably the coconut palm (Palmaeae or Arecaceae). The adults, which are nocturnal, generally attack only damaged, fallen, or decomposing trunks. The larvae bore within and pupate near the outer bark. (See the species for further details). These weevils are not found on other Caribbean islands

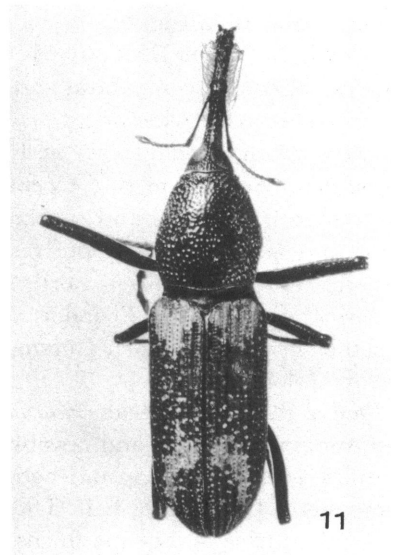
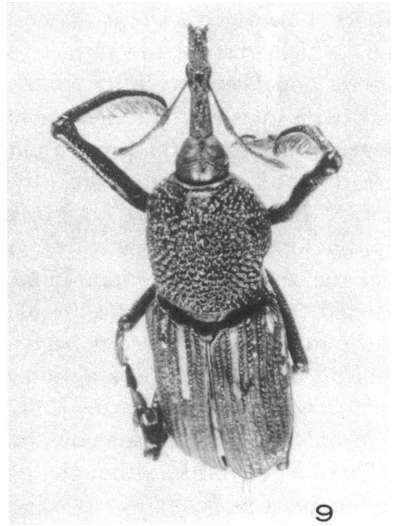
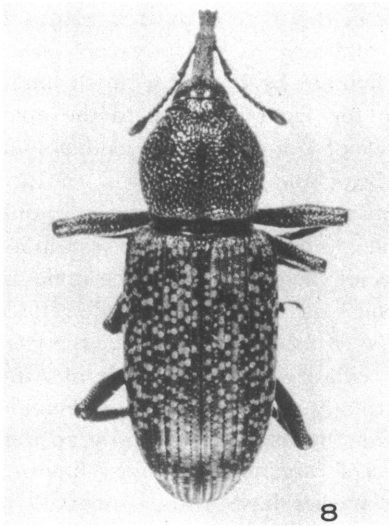
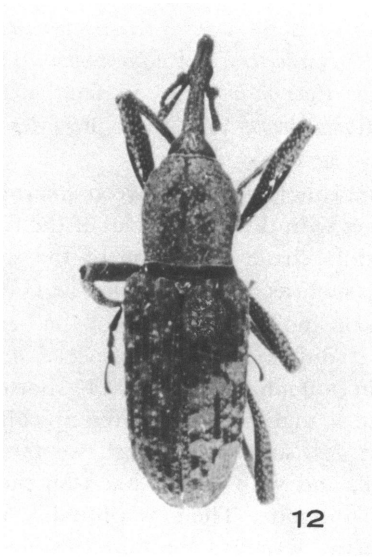


FIG. 8. *Yuccaborus frontalis sharpi*.

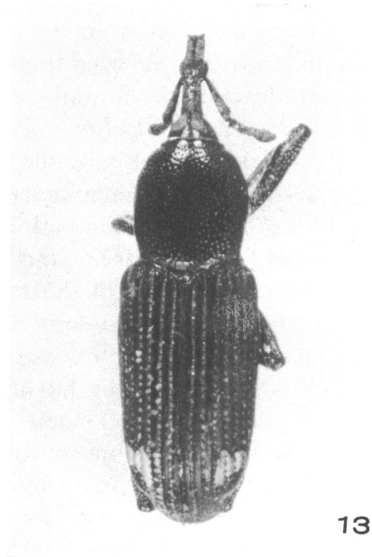
FIGS. 9-11. *Rhinostomus*. 9. *R. meldolae*, male, tipped backward to show curved front tibiae. 10. *R. oblitus*, large female. 11. *R. scrutator*, male. Photographs not to scale.

that have palm trees, perhaps because the other islands are too small.

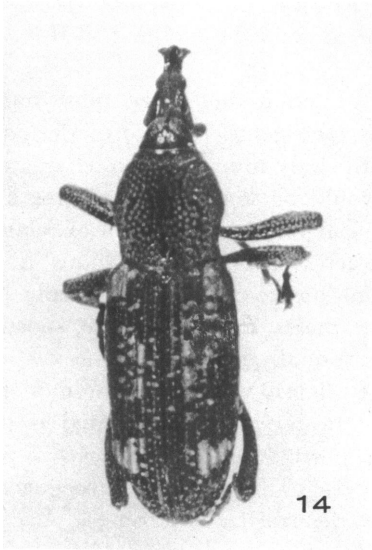
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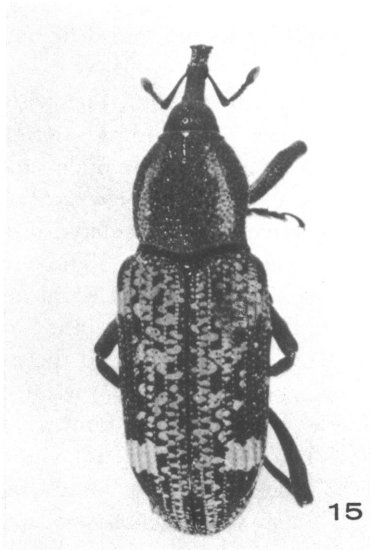
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14



15

FIGS. 12-15. *Rhinostomus*. 12. *R. thompsoni*, male. 13-15. Variations in elytral pattern in *R. quadrisignatus*.

ish species with contiguous front coxae, one of which was described as *Harpacterus*, should be merged with the four large, spectacular species

(*barbirostris*, *niger*, *oblitus*, and *scrutator*) which are now included in *Rhinostomus*. This proposal does not take into account a seventh species (*meldolae*) which has been referred to either "*Harpacterus*" or *Rhinostomus*. The reason for this taxonomic ambiguity is that *meldolae* is, in fact, intermediate between "*Harpacterus*" and *Rhinostomus*, and thus provides a good argument for combining these two genera.

Rhinostomus meldolae is intermediate morphologically between *Rhinostomus* and "*Harpacterus*" as follows: It shares with the four species of the former the widely spaced front and middle coxae and some of the secondary sexual characters of the male, such as the long front legs, the long, dentate beak, and the long hairs on the under surface of the beak and pronotum. On the other hand, it differs from those species and agrees with "*Harpacterus*" by having the antennal club (fig. 21) shorter, more oval, not narrowly elongate, with a smaller spongy area apically, the glaze of the elytra more tomentose, less smooth, the first two tarsal segments (fig. 29) wider, more massive, and with denser hairs on their ventral surface, and the legs densely punctate. There is probably no ecological difference to keep the "genera" separate (nothing, however, has been published on the habits of *meldolae*, *thompsoni*, and *quadrisignatus*), and the geographic distribution supports the merging of the two genera.

If, on the other hand, one wished to retain the larger, more hairy "bottle washers" (including *meldolae*) in one genus because of the conspicuous characters of the males, then the only morphological characters remaining to diagnose "*Harpacterus*" would be some which are relative or which have been considered insufficient for the separation of related genera of the subfamily. These characters are the contiguous front coxae, the more narrowly separated middle coxae, the less deeply bilobed third tarsal segment, and, in the males, the nondentate, shorter, and scarcely hairy beak, and the proportionally shorter front legs.

Lacordaire (1866, p. 317) wrote that "*Rhina*" was one of the most remarkable genera of the family and that it would be isolated if the species of *Harpacterus* did not connect it with those of *Mesocordylus*. He believed that *Harpacterus* "made the passage" between the two genera. Actually, *Yuccaborus*, which was not yet described at the time of Lacordaire, seems more closely allied to *Rhinostomus* than does *Mesocordylus*. Lacordaire (*loc. cit.*) found the species of "*Rhina*" very homogeneous in facies and sculpture, the pronotum with large, deep, confluent punctures, and the elytra strongly furrowed, with lattice-like, "cloisonnés" striae and narrow intervals. Lepsme (1947), who reviewed the genus *Rhinostomus* briefly and gave a key to the species, remarked that the species

were so similar that it was useless to describe them separately. They differ, however, in addition to the characters he gave in his key, in the aedeagus and other sexual characters of the male.

Approximately 800 specimens have been examined, more than half of which are the continental species, *niger* and *barbirostris*. As for the types, those of Desbrochers des Loges, Drury, Fabricius, Illiger, Jacquelin-Duval, Olivier, Panzer, and Pascoe have not been found. The type of *ebeninus* Boheman was compared with my specimens by Richard T. Thompson of the British Museum (Natural History). I have examined the types of six of the nine forms considered as synonyms, but the type of only one of the valid species (*quadrisignatus* Boheman). Three species have been placed in synonymy, and one new species is described from Panama.

REMARKS ON SOME TAXONOMIC CHARACTERS

VESTITURE

The same kind of long, fine, wispy yellow or reddish hairs, or ciliae, are present on the beak, prosternum, front tibia, front tarsus, and elytra of the males of some species. This pubescence is sparse on the elytra, dense on the other parts. Fine, but shorter, single or double hairs or setae are present in virtually all punctures of both sexes, but these hairs are generally not visible except under the microscope. Within the punctures on the pronotum of *oblitus* is still another kind of pubescence, a flat-appearing hair, split into five or more strands, which resembles an open fan (fig. 25). The short, dense hairs on the pronotum and elytra of *thompsoni* are united into little tufts, or hairy tubercles. Similar but proportionally smaller hairy mounds encircle the front portion of the elytral punctures of *scrutator*.

The whitish coating or covering on parts of the elytra of some species, which I call an opaque or waxy glaze, is rather puzzling. At high magnification ($\times 48$ or $\times 54$), this white glaze seems to be of the same consistency and quality as the black tegument, but it becomes thrust aside when a pin is drawn through it. It does not obscure the setae-bearing punctures, which show as black dots. It is very similar to the yellow or gray enamel-like coating that covers the entire surface in *Sphenophorus aequalis* Gyllenhal. In *meldolae* and *quadrisignatus* the glaze seems to be interspersed with very short, dense hairs. When not abraded, the glaze is as opaque as a coat of white paint.

GENITALIA

In all but three species, the aedeagus (figs. 38-44) differs interspeci-

fically in the shape of the apex or in the width of the apical sclerotized border. Among *barbirostris*, *oblitus*, and *scrutator*, however, it scarcely differs, although the apex is slightly more acuminate in *scrutator*, and its surface is somewhat concave in *oblitus*. The apodemes are of about the same length as the aedeagus. There is no sclerotized flagellum. The eighth tergum of males is nearly the same in all species, the apex being rounded-truncate with, in some specimens, a slight median emargination visible through the dense fringe of hairs. A feeble longitudinal impression is present in *niger* and *barbirostris*, and may be present toward the base only in the other species.

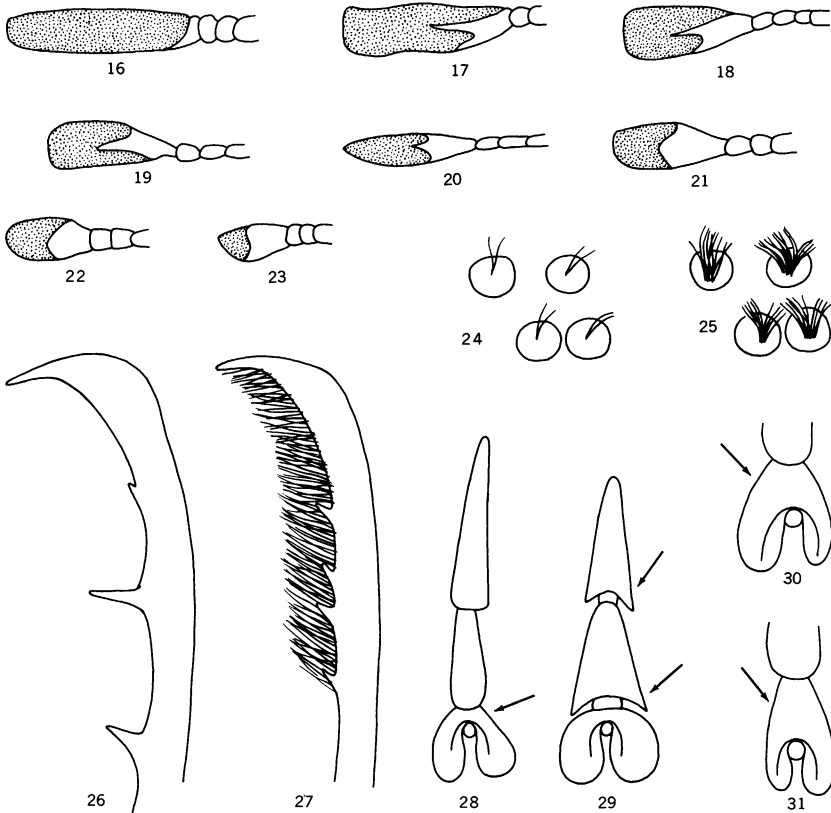
The eighth tergum of females also scarcely differs among the species. At the apex it is rounded or rounded-truncate, except in *barbirostris* in which there is a small median projection or sinuation. In some species the fringe or double fringe of hairs at the apex is so dense that the border is quite hidden. The shape of the tergum of females (figs. 46, 47) is more narrowed to the apex than that of males. There are slight differences in the genitalia bearing the styli, but they may be due to the handling of the soft parts (fig. 45).

ANTENNAE

The extension of the sclerotized (or corneous) basal part of the antennal club into the spongy apical area is quite variable within a species, but the degree of difference between species can be established nonetheless. Thus the basal part is minute (and the spongy part correspondingly large) in *barbirostris* and *niger* (fig. 16); it encircles the club to about the middle or beyond the middle in *meldolae*, *quadrisignatus*, and *thompsoni*, and it extends narrow, pointed wedges into the spongy part in the two species from the Greater Antilles (figs. 17-23). Lacordaire (1866, p. 316, footnote) remarked that the corneous part was a vestige of the first segment of the club. Because of its more or less compressed condition, the club has two flatter, wider surfaces (figs. 16-19, 21-23), and two narrower, elliptical surfaces (fig. 20). The corneous area usually extends farther front on the inner surface than it does on the outer, but as the antennae on mounted specimens are often twisted, it may be difficult to know which is the outer and which the inner surface (or face). The shape of the club, and the amount of the corneous part, vary somewhat individually, the variation being more evident when specimens of unequal size are compared.

BEAK OR ROSTRUM

The length of the beak is measured from the front of the eyes to the



FIGS. 16-23. Left antennal club of *Rhinostomus*. 16. *R. barbirostris*; characteristic also of *R. niger*. 17. *R. oblitus* (Cuba), inner face of club. 18. *R. scrutator* (Santo Domingo), inner face of club. 19. *R. scrutator*, outer face of club. 20. *R. scrutator*, flattened side of club. 21. *R. meldolae* (Andaman Islands). 22. *R. quadrisignatus*, inner face of club (on outer face spongy part is longer). 23. *R. thompsoni*.

FIGS. 24, 25. Pronotal setae emerging from punctures. 24. *R. scrutator*. 25. *R. oblitus*, female.

FIGS. 26, 27. Apical half of front tibia of males. 26. *R. barbirostris*. 27. *R. niger*; characteristic also of *oblitus*, *scrutator*, and *meldolae*.

FIGS. 28, 29. Hind tarsus. 28. *R. barbirostris*, showing deeply bilobed third segment. 29. *R. meldolae*, showing widened segments.

FIGS. 30, 31. Third segment of hind tarsus (scale larger than that of two preceding figures). 30. *R. quadrisignatus*. 31. *R. thompsoni*.

apex of the beak. The dentations on the beak of males, where present, are quite variable in shape, size, and number. I consider these to be in-

dividual variations, although Lepesme (1947) gave the degree of divergence of the large median teeth over the antennal insertion as a species character to distinguish *niger* (Madagascar) from *afzelii* (Sierra Leone). He said the teeth were more divergent and spread apart in *niger* and less divergent and more erect in *afzelii*. However, examination of many males from the mainland of Africa for this character shows a great variability throughout, the teeth being divergent or erect, thick or thin, sharp or blunt, even single or double. This diversity is present also in males of the other species.

The shape of the extreme dorsal apex of the beak would seem to be a good measurable character, but when many specimens are examined, deviations become apparent. Thus, in some males of *scrutator* and *niger* the apex varies from truncate to slightly emarginate; in some males of *thompsoni*, *barbirostris*, *oblitus*, and *niger* it projects forward either as a blunt finger or upward as a curved hook; in *meldolae* it is rather triangular. No doubt this exposed part receives a great many shocks.

SCUTELLUM AND ELYTRA

The scutellum, as in other members of the subfamily, has a certain general characteristic shape, which nonetheless varies individually a good deal. In *Rhinostomus* it is much wider at the base than at the apex and is at least twice as wide as the base of the adjacent first interval of the elytra. The apex is blunt in many specimens so that the shape can be more semilunar than triangular.

The strial punctures of the elytra are almost square and lattice-like, but in *thompsoni* and occasional specimens of *oblitus*, *quadrisignatus*, and *scrutator* they are round. In *barbirostris* and *niger* they are as wide as, or wider than, the intervals. (In discussions of the intervals of the elytra, the sutural interval is considered synonymous with the first interval.)

KEY TO THE SPECIES OF *Rhinostomus*

1. Front coxae virtually contiguous, separated by narrow line; third tarsal segment bilobed shallowly at apex or at middle (figs. 30, 31) 2
 Front coxae separated by at least one-fourth of diameter of coxa; third tarsal segment deeply bilobed to near base (figs. 28, 29) 3
2. Pronotum punctate, not granulate; eyes separated above by single glabrous carina *quadrisignatus* (Boheman)
 Pronotum granulate, punctures surrounded by hairy mounds; eyes separated above by two hairy carinae with depression between
 *thompsoni*, new species
3. First and second tarsal segments ventrally densely spongy-hairy; antennal club with chitinous basal portion about equal in size to spongy apical

- portion and separated from it by sinuous line (fig. 21); Oriental region
meldolae (Pascoe)
 First and second tarsal segments ventrally with hairs on sides only, median
 third glabrous; antennal club with chitinous basal portion either minute
 or extending angularly into spongy apex (figs. 17-19); Africa and Western
 Hemisphere 4
4. Eyes above separated by width of antennal segment and by double carina;
 front tarsus of male fringed with long hairs chiefly on inner side; Greater
 Antilles 5
 Eyes above virtually contiguous, separated by single carina; front tarsus of
 male not fringed with hairs; Africa, Mexico, Central and South America
 6
5. Elytral intervals (viewed at high magnification) with setose punctures flat;
 pronotal punctures with setae (unless worn) in fanlike tufts of five or more
 strands (fig. 25); antennal club and its spongy apex longer (fig. 17);
 Cuba; island of Haiti *oblitus* (Jacquelin-Duval)
 Elytral intervals (viewed at high magnification) with setose punctures sur-
 rounded by minute tomentose mounds; pronotal punctures with setae in
 double or triple strands; antennal club and its spongy apex wider and
 shorter (figs. 18, 19, 24); islands of Haiti and [?] Montserrat
 *scrutator* (Olivier)
6. Front femur virtually impunctate; carina between eyes scarcely elevated;
 front tibia on inner edge with long teeth (fig. 26); front tibia of male
 without hairs; Mexico to South America *barbirostris* (Fabricius)
 Front femur strongly punctate in apical third; carina between eyes forming
 distinct crest; front tibia on inner edge with short teeth (fig. 27); front
 tibia of male on inner edge ciliate; Africa, Madagascar *niger* (Drury)

Rhinostomus barbirostris (Fabricius)

Figures 7, 16, 26, 28, 34, 38, 47

Curculio barbirostris FABRICIUS, 1775, p. 135, "in Indiis," error for South or
 Central America; type, male, not in Fabricius' collection in Copenhagen (Zim-
 sen, 1964, p. 210).

Curculio validus PANZER, 1798, p. 50, pl. 35, fig. 3, Brazil; type not found.

Rhina verrirostris ILLIGER, 1806, p. 244, Brazil; type not found.

Rhina ebriosa FAHRAEUS, 1838, p. 791, Mexico; type, female, in Naturhistoriska
 Riksmuseum, Stockholm, examined.

Rhina costalis FAHRAEUS, 1838, p. 793, Brazil; type, male, in Naturhistoriska
 Riksmuseum, Stockholm, examined.

Rhina affaber FAHRAEUS, 1838, p. 794, Mexico; type, female, in Naturhistoriska
 Riksmuseum, Stockholm, examined.

DIAGNOSIS: This species and *niger* (Africa) are dorsally almost exactly
 similar, the specific differences being in the punctuation of the front
 femur, the height of the carina between the eyes, and for *barbirostris*, the
 longer teeth and absence of hairs on the front tibia of the male. Both
 species differ from those that follow either by being entirely black or by
 having widely spaced coxae; also by having the lattice-like strial punc-

tures wider than the intervals. Both species can be distinguished from denuded, therefore black, specimens of *oblitus* and *scrutator* by having only a single narrow carina between the eyes, not a double carina.

RANGE: Nayarit in western Mexico, and southern Mexico, including Yucatan, south through Central America to Trinidad and South America where it occurs in every country except Chile, but not south of Buenos Aires, Argentina. Specimens examined, 449.

DESCRIPTION: Length, excluding beak, 11 to 40 mm. Color black.

Eyes virtually contiguous above, separated only by slightly elevated carina. Beak of male longer than pronotum, that of largest males as much as one-third longer; two teeth at middle over antennal insertion larger than other teeth; apical half dorsally and laterally and all of under surface with conspicuous brush of dense, long (longer than depth of beak), reddish or yellow hairs. Beak of female shorter than pronotum, hairs inconspicuous; apical half dorsally at middle with flattened, impunctate area bordered by oval punctures; basal half on each side minutely dentate or tuberculate; under surface glabrous or with few hairs. Antenna inserted at about middle of beak; club elongate (fig. 16), almost as long as funiculus, subcylindrical; almost entirely spongy; second segment of funiculus not more than one and one-half times length of third. Pronotum as long as wide (that of some males longer than wide), densely, confluent punctate, some specimens with impunctate median area, or with impressed median line, or with two round impressions each side of middle; base slightly bisinuate; vestiture of male on front and sides consisting of long, wispy hairs (hairs can be worn short) as long as those of beak; hairs shorter near base of pronotum; vestiture of female consisting of short, single hairs emerging from each puncture. Elytra, striae with large, deep quadrate punctures; intervals narrower than striae, somewhat uneven of surface and raised above level of striae, with single or irregular rows of flat-edged punctures; from each puncture a short hair or hairs which are shorter than width of interval. Prosternum more or less flat, that of female with short hairs in punctures, of male with long, wispy hairs as on beak; remainder of ventral side and legs with one or several hairs from each puncture, hairs denser on apical segment of abdomen. Front and middle coxae separated by about one-half of width of coxa. Front legs, especially of male, longer than other legs. Femora and tibiae punctate feebly, front femur so sparsely as to appear impunctate; front tibia, both sexes, slightly incurved (more so in male), and with two or more large, sharp teeth on inner side, at least some teeth longer than tibia is wide; other tibiae straight, denticulate on inner side; middle tibia of some specimens wider basally due to ex-

pansion of carinate outer edge. Tarsus, first segment from one and one-half times to nearly twice as long as second, both segments at apex slightly bulbous and narrower than width of tibia; third segment widely dilated, deeply bilobed; first and second segments hairy below at sides only, median third or more being glabrous; claw segment inserted at base of third. Aedeagus (fig. 38) at apex rounded-acuminate, with wide border. Eighth tergum of female at apex with slight projection (fig. 47), with lateral and apical hairs.

ECOLOGY: More than a hundred years ago Lacordaire (1830, p. 166) reported that this species was common in Brazil. It could be found walking slowly on leaves to which it clung tightly if one tried to pick it up. It was first noted as a pest of the coconut in British Honduras at the turn of the century, and in 1909 in Trinidad. In Brazil in 1922, Bondar (1940) was the first to make known its biology and the damage it did to the coconuts of Bahia.

The hosts given by Lepesme (1947) for this species are the same as those given by Costa Lima (1956), and both authors relied on Bondar (1940) and Wolcott (1933). The palms are: *Cocos botryophora*, *coronata*, *nucifera* (the coconut palm), *romanzoffiana*, and *schizophylla*; also *Diplorhynchium caudescens*; also *Attalea funifera* (the broom palm), *pindobossu*, *piassa-bossu*; and *Elaeis guineensis* (the oil palm).

The account that follows is taken almost exclusively from Bondar (1940, pp. 39-49). The "bearded" weevils choose generally old or sick trees with hard trunks that have already been damaged either by other insects or by the heat of fires which the farm laborers light around trees to make them give fruit.

The adults are nocturnal. During the day they hide in the crown of the palm, in the axils of the leaves, in the inflorescences or sheaths, or in the cavities or irregularities at the base of the tree. At night they descend to the hardened part of the trunk that is damaged or burnt, rarely going to the soft part at the crown. The female gnaws a little hole 4 mm. in diameter in the bark, then turns and deposits a round, white egg of 2 mm. The female then covers the egg with a "chitinous" secretion, which when hard resembles a scale insect, and proceeds to another hole. If available, the female utilizes cavities or galleries left by the larvae of a large weevil of the subfamily Cholinae, *Homalinotus coriaceus* Gyllenhal. The cylindrical, white recurved larva with its yellow spots and abruptly truncated last segment is from 20 to 50 mm. long and 7 to 20 mm. wide when grown. The final size depends on the nature of the food; in living coconuts with much succulent juice, the larvae are bigger, whereas in dead trees in which the circulation of the

juice is suspended, the larvae are smaller.

The larvae (there may be dozens working together in a limited part of the trunk) tunnel inward horizontally, and riddle the interior with galleries. In the first few days they expel some sawdust, sometimes mixed with juice of the tree, which stains the trunk and reveals their presence. Within the trunk, they work slightly upward and round and round for four or five months until they reach the time of final transformation. At this point they make their way out by a horizontal canal to the periphery of the trunk where, with the head turned toward the outside, they transform into nymphs without any protection except the thin bark. At the proper time the adult with beak directed forward easily cuts a way out of the thin protecting wall. The many holes left by the exiting adults, and the cavernous internal galleries made by the larvae weaken the trunk so that the first strong wind may knock it down or break it off.

Both Wolcott (1933) and Bondar (1940) said that the larva does not make a cocoon, but Lepesme (1947) said that, as is true of most calandrine weevils, the pupation takes place in a cocoon made of interlaced fibers.

According to Bondar (1940), adults are found throughout the year but are more common and do more damage from October to March. He believed that the life cycle took about six months, of which five were spent in the larval stage. He wrote that Professor Urich in Trinidad gave the cycle as three months or less.

The larvae are attacked by a histerid beetle, *Oxysternus maximus* Linnaeus, which also attacks the larvae of *Rhynchophorus palmarum* Linnaeus, another borer in palm trees. Other enemies of *barbistrotris* are various ants and parasites and also woodpeckers and some hymenopterous insects. The adults may be attacked when ovipositing at night by bats and nocturnal insectivorous birds.

Notations of habits on specimen labels are not numerous. Three specimens I examined were collected by E. Hagley in Trinidad in 1963 from the "petiolar axils of coconut," and three of each sex were collected by Reinhardt at Sete Lagoas, Brazil, in the decaying trunks of a palm.

REMARKS: In addition to the illustration of the female by Panzer (1798), cited above for *validus*, there have been many illustrations of this species by Herbst (1795), Olivier (1808), Heyne and Taschenberg (1908), Champion (1910), Bondar (1940), Guérin (1953), Costa Lima (1956), and no doubt others. Because it is so variable in size and in the corresponding development of the beak, antennae, and legs of the males, *barbistrotris* has been described many times. Schoenherr (1838) synony-

mized Panzer's and Illiger's names; Chevrolat (1885) synonymized the small Mexican *affaber* with the large Mexican *ebriosa*, and Champion (1910) synonymized both, as well as the small *costalis* from Brazil. I have seen the types of the three last-mentioned forms and agree with Champion that they are conspecific with *barbirostris*.

Rhinostomus barbirostris and *niger* (Africa), have similar elytra with large, quadrate stria punctures that are wider than the intervals, not, as in the species discussed below, narrower. The antennal club of these two species, *barbirostris* and *niger*, is also similar, being longer, narrower, and more cylindrical than that of the remaining species, and almost entirely spongy with only a minute corneous part at the base. They differ, however, as stated in the diagnosis, and also in the shape of the apex of the aedeagus (figs. 38, 39) and in their distribution. Because of their dorsal similarity, they were often misidentified by early authors who, furthermore, did not realize that each species was restricted to one hemisphere. Thus the New World species (*barbirostris*) was reported from the Indies by Fabricius (1775), from "America australi and India," by Gmelin (1790), from the Cape of Good Hope by Herbst (1795) and Olivier (1807), and from America, Africa, and Asia by Bertolini (1849). Another reason for the confusion is that the type of *niger* is a female, and perhaps it was not known that in the male, in contrast to the male of *barbirostris*, the front tibiae are abundantly ciliate.

The other species occurring in South America (*quadrisignatus* and *thompsoni*) are not found north of Panama. *Rhinostomus barbirostris* is readily distinguished from them by having the antennal club very long and almost entirely spongy, the coxae widely spaced, the elytral striae much wider, and the femora virtually impunctate.

Four males and two females were dissected.

Rhinostomus niger (Drury)

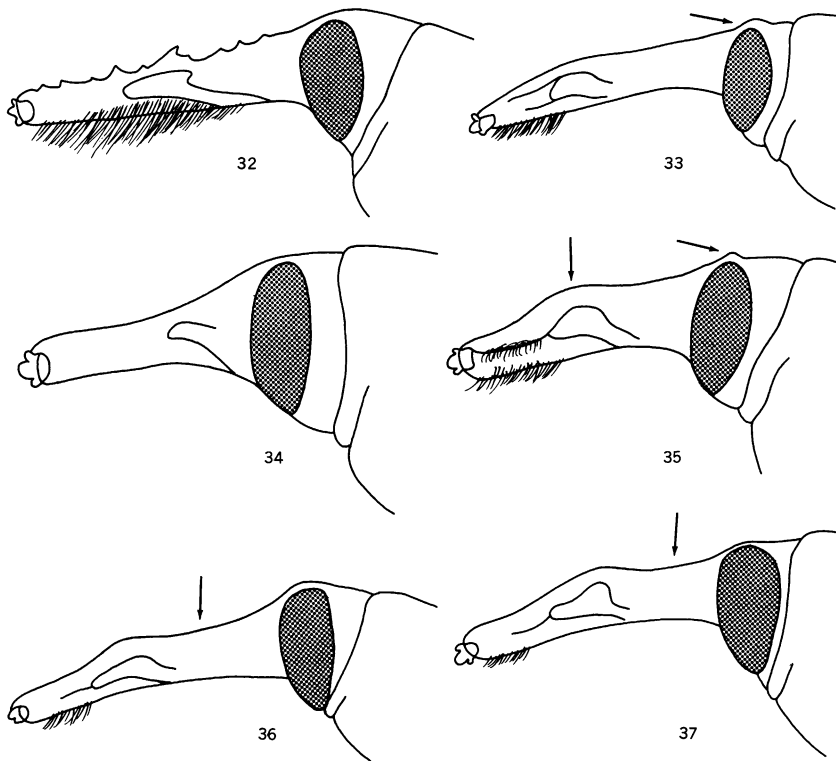
Figures 16, 27, 39

Curculio niger DRURY, 1773, p. 63, and index, pl. 34, fig. 2, "Island of Johanna, near Madagascar"; type, female, not found. HERBST, 1795, p. 54, pl. 12, fig. 10.

Rhina Afzelii FAHRAEUS, 1838, p. 797, Sierra Leone; type, male, in Naturhistoriska Riksmuseum, Stockholm, examined. New synonymy.

Rhina amplicolis GERSTAECKER, 1855, Mozambique; type, male, labeled "Tette" [=Tete, Mozambique], in Zoologisches Museum, Berlin, examined.

DIAGNOSIS: There is little difference between *niger* and *barbirostris* of the New World (see Diagnosis of *barbirostris*). In *niger*, the interocular space is distinctly elevated, the femora are punctate near the apex, the tibial teeth are shorter, and the male has hairs (fig. 27) on the inner side of the front tibia.



FIGS. 32-37. Rostrum or beak of *Rhinostomus*. 32. *R. meldolae*, type, male. 33. *R. thompsoni*, type, male. 34. *R. meldolae*, female; characteristic also of females of *R. barbirostris*, *oblitus*, and *scrutator*. 35. *R. thompsoni*, female. 36. *R. quadrisignatus*, male, Peru and Ecuador, showing longer basal part. 37. *R. quadridignatus*, male, Brazil, showing shorter basal part.

RANGE: All tropical Africa (fig. 7), chiefly on the eastern and western coasts, including Madagascar and the Comoro Islands. Specimens examined, 238.

DESCRIPTION: Length, excluding beak, 10 to 35 mm. Color black.

Eyes, beak, and antenna as described for *barbirostris*; carina between eyes more elevated and knifelike, and club slightly shorter. Pronotum, elytra, prosternum, and under surface as described for *barbirostris*, but some females with separate tufts of longer hairs at extreme apex of abdomen. Front legs, length, and intercoxal widths as described for *barbirostris*. Femora and tibiae strongly punctate except on front femur in basal half or three-fourths where impunctate or transversely striate;

front tibia slightly incurved at apex (that of male more so), and with two or more (usually five or six) small teeth on inner edge, teeth shorter than width of tibia; front tibia of male in apical half on inner edge with fringe of yellow hairs longer than width of tibia; other tibiae straight, denticulate on inner edge, denticles of hind tibia scarcely visible, more like spines. Tarsi as described for *barbistrostris*. Aedeagus (fig. 39) at apex rounded-truncate, with rather narrow, flat border. Eighth tergum of female at apex rounded-truncate and with lateral and apical hairs.

ECOLOGY: Lepesme (1947) wrote that *afzelii*, which he considered distinct from *niger*, had the same habits as *barbistrostris*, and that the coconut palm tree was one of the host plants. For "*afzelii*" he gave the rattan or raffia palm (*Raphia vinifera*) as the principal host in the Congo, also *Raphia laurentii*, and the oil palm (*Elaeis guineensis*). For *niger* he gave *Pandanus utilis*, the screw pine, as well as the coconut. Coquerel (1848) also found *niger* in *Pandanus*; at Sainte-Marie, Madagascar, the thick-set, compact larvae were in great abundance in a fallen, fast decomposing trunk. Specimens of *niger* from the mainland of Africa (as "*afzelii*" or "*amplicolis*") were found in oil and coconut palms (Hargreaves, 1937) in Sierra Leone, either in the crown or at the base of the leaf petiole. Harris (1937) listed the species as the coconut stem-borer in Tanganyika (Tanzania). Aders (1919, p. 147) said "adults, larvae, and pupae of this large weevil were found in a dead coconut tree in Pemba." Specimens have been captured at light. A male from Nsanakang in the Cameroons was collected from the crown of a fallen oil palm.

REMARKS: Champion (1910, p. 176, footnote) wrote that he could not detect any difference between *afzelii* and *niger* when individuals of the same size were compared. Although Lepesme (1947) kept them as separate species, I agree with Champion. I have seen about 30 specimens from Madagascar (*niger*), and cannot differentiate them from the type of *afzelii* (Sierra Leone) or from other specimens from the rest of Africa. Even the aedeagus, which differs among species, appears to be the same here. The characters utilized by Lepesme were all relative ones (punctuation of pronotum, direction of large teeth on beak of male, length of club, and thickness of funiculus of antenna) which vary greatly in all species. The type of *afzelii* is a large male of about 30 mm., excluding beak; the type of *niger*, which has not been found, is illustrated as a female and was said by Drury, its author, to be at least one and a quarter inches long. Lepesme synonymized *amplicolis* with *afzelii*. The pronotum of the type of *amplicolis* is cracked at the base giving it a wider appearance than is normal.

Rhinostomus niger agrees with the three insular species (*meldolae*, *oblitus*, and *scrutator*) by having hairs on the inner edge of the front tibiae of the male, but it does not have the tarsi ciliate as do *oblitus* and *scrutator*.

A slight difference noted between *niger* and *oblitus* and *scrutator* is that the mesosternal process between the middle coxae extends angularly onto the inner face of the coxa. In some specimens of *barbirostris*, however, there is a trace of the angle, which is represented by a situation in the same place.

Two males and four females were dissected.

Rhinostomus oblitus (Jacquelin-Duval)

Figures 10, 17, 25, 34, 40

Rhina oblita JACQUELIN-DUVAL, 1857, p. 229, pl. 9, fig. 21, Cuba; type, male, not found. HEYNE AND TASCHEBERG, 1908, p. 233, pl. 32, fig. 12 (as *scrutator*).

DIAGNOSIS: Similar to *scrutator* in size, male characters, and whitish elytra, but differing as shown in table 2. Differing from *barbirostris*, but similar to *scrutator*, *niger*, and *meldolae* in the ciliate front tibia of male. Differing from all species except *scrutator* in having long ciliae on sides of front tarsus of male.

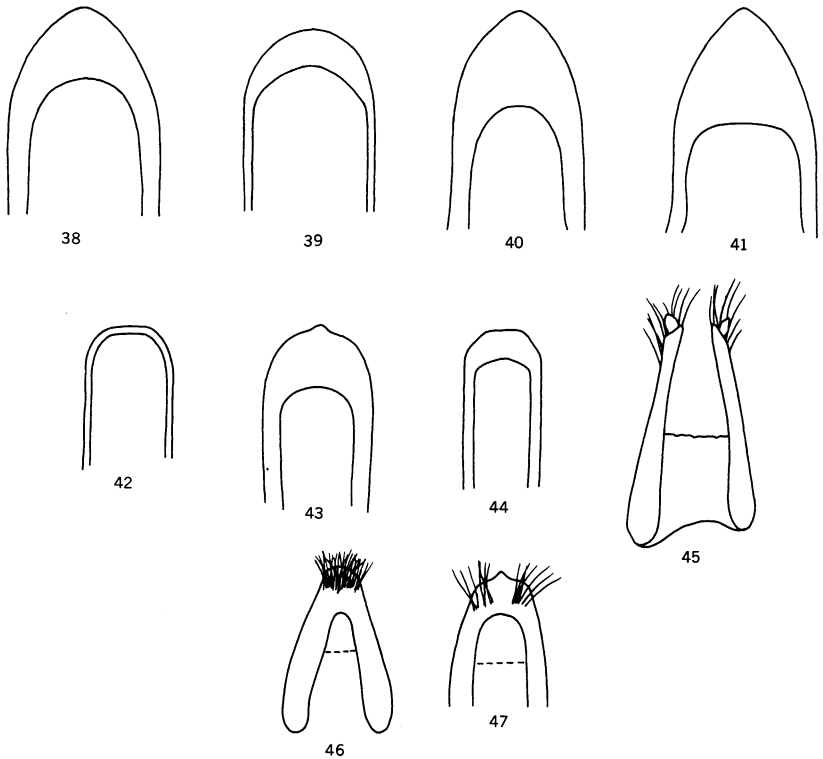
RANGE: The island of Haiti (or Hispaniola), all of Cuba, and the Isle of Pines. Specimens have been seen from Mexico and Brazil, but probably the species is not established in those countries. Specimens examined, 122.

DESCRIPTION: Length, excluding beak, 11 to 37 mm. Color of fresh specimens black with lines of white, (or yellowish) opaque, squamose glaze on alternate elytral intervals; on other alternate intervals lines of white broken up into spots, or short stripes, or mere dots around punctures; white often denser at base of elytra, and in most specimens two outer intervals before last almost solidly white throughout; many specimens appearing entirely black, but showing white when soaked; well-marked specimens with white on some part of every interval.

Eyes narrowly separated above by double carina, space between eyes slightly narrower than apex of antennal scape. Beak of male longer than pronotum; with two or more teeth at middle over antennal insertion larger than other teeth; apical half surrounded by conspicuous brush of dense, long (longer than depth of beak), yellow or reddish hairs. Beak of female slightly shorter than pronotum; hairs inconspicuous; apical half at middle impunctate and shining, basal half punctate, not tuberculate; underside glabrous or with few scattered hairs. Antenna inserted at about middle of beak, club (fig. 17) elongate, compressed,

with sides virtually parallel; spongy part of club comprising three-fourths of club, basal corneous "wedge" either absent or not extending to one-half length of club; second segment of funiculus almost three times length of third. Pronotum about as long as wide; densely, in some specimens confluent, punctate except on impunctate median area of varying size; base virtually straight; vestiture of male at front and sides consisting of long, wispy hairs (worn short in many specimens) emerging from punctures, hairs as long as those on beak; near base of pronotum from each puncture many short strands of fan-shaped hairs; vestiture of female consisting of fan-shaped hairs from all punctures, but no long, wispy hairs. Elytra (see above for color) with strial punctures large, deep, quadrate, or more or less round or oval; intervals wider than striae, either slightly convex or nearly flat, with single, slightly irregular rows of widely or narrowly spaced, flat-edged punctures from each of which emerge from one to three long hairs (as long as, or much longer than, width of interval). Prosternum and hairy ventral side as described for *barbirostris*, but apex of abdomen of female with two separated tufts of longer hairs. Front and middle coxae separated by one-fourth or more of diameter of coxa. Front legs, especially of male, very long. Femora and tibiae feebly punctate; male with front tibia slightly incurved at apex, its apical third or half on inner edge fringed with golden hairs at least twice as long as width of tibia and with four or more denticulations about one-half width of tibia; other tibiae straight and with inconspicuous hairs on inner edge; middle tibia with several denticulations; female with all tibiae straight, denticulations fewer, hairs short. Tarsus and claw segment as described for *barbirostris*, but first segment no more than one-third longer than second, and front tarsus of male with long, wispy hairs (longer than width of tibia) spreading out laterally from first two segments. Aedeagus (fig. 40) at apex rounded-acuminate, and with wide border which at center is longitudinally slightly concave. Eighth tergum of female (fig. 46) with apex obscured by many rows of long, dense hairs.

ECOLOGY: Found in Cuba and Hispaniola (Wolcott, 1933, p. 327) "on dead or dying coconut palms but [it] is so rare by comparison with the continental species [*R. barbirostris*] found in Trinidad that little is known concerning it." Bruner, Scaramuzza, and Otero (1945) in their catalogue on insect pests of economic plants in Cuba gave *oblitus* a common name, "picudo barbudo de las palmas." They said it was destructive of the royal palm (*Roystonea regia*), but that infestations were rare and of short duration. *Oblitus* also attacks weakened palmettos (*Palma cana*), in Camaguey, central Cuba, the dead or fallen trunks being covered with holes



FIGS. 38-44. Apex of aedeagus of *Rhinostomus*, dorsal view. 38. *R. barbirostris*. 39. *R. niger*. 40. *R. oblitus*. 41. *R. scrutator*. 42. *R. meldolae*. 43. *R. quadrisignatus*. 44. *R. thompsoni*.

FIGS. 45, 46. *Rhinostomus scrutator*, female. 45. Genitalia, with styli; characteristic also of other species. 46. Eighth tergum with apical hairs; characteristic also of *R. oblitus*.

FIG. 47. Apex of eighth tergum of *R. barbirostris*, female, showing slight apical projection.

made by emerging adults. These authors had not seen *oblitus* attack the coconut palm, as had Wolcott. Many specimens are labeled as having been collected at lights.

REMARKS: When in perfect condition, *oblitus* is separable from all other species by the many longitudinal white lines or dots that nearly cover the black of the elytra. Many specimens, however, have some or all of this whitish opaque glaze worn off or greased over, and appear entirely black (in a series of 62 specimens from Cuba more than half are black). Wetting the black specimens with water may restore the white pattern;

soaking them in carbon tetrachloride usually succeeds. In semi-denuded condition the elytra resemble those of *scrutator* Olivier, 1807 (type locality, Saint-Domingue). There is much confusion of identity in the literature and in collections between these two species, both of which have been reported from the two adjacent islands of Cuba and Haiti. Some authors (Lacordaire, 1866; Champion, 1910; Lepesme, 1947) have considered them to be the same species. However, the elytral pattern differs, although it is subject to abrasion in both species, and there are other slight, but constant differences (table 2).

Both species have been reported from Cuba, but I believe that only *oblitus* occurs there and that the records of *scrutator* from Cuba are due to misidentification. On the other hand, I have seen both species from Haiti. Of 110 specimens examined, I found 12 *scrutator* and five *oblitus* from Santo Domingo, but no *scrutator* and 93 *oblitus* from Cuba. Gundlach, the Cuban entomologist, recorded only *oblitus* from Cuba, saying (1894, p. 330) that he omitted *scrutator* from his list because there was no certainty that it had ever been taken in Cuba.

It is strange that virtually all museum specimens have been identified as *scrutator*. One reason may be that *scrutator* was the first species to be described by a well-known author, Olivier, whose name was thus applied to all black and white *Rhinostomus* from the Greater Antilles. Jacquelin-Duval's description of *oblitus* appeared in a history of the island of Cuba and probably received less attention. The differences between the two forms had not gone unnoticed, however, as Chevrolat (1851) had called the attention of the French entomological society to the fact that the "*scrutator*" of Cuba was distinct from Olivier's *scrutator* from Saint-Domingue, and was therefore new.

Although both Chevrolat and Jacquelin-Duval said that the two species were distinct, neither stated the differences, nor have I seen any published account of differences. Neither type has been found. Jacquelin-Duval's illustration (1857, pl. 9, fig. 21) of *oblitus* represents a beautiful typical male with the white lines most marked at the base and sides of the elytra. Olivier's figure (1808, pl. 29, fig. 428) of the female of *scrutator*, although showing more white than is present in most specimens, shows also that the outer intervals of the elytra are typically black. Heyne and Taschenberg's female (1908, pl. 32, fig. 12) from "Haiti" is a typical *oblitus*, although they named it *scrutator*. L. L. Buchanan, who was for many years curator of the weevil collection at the United States National Museum, Smithsonian Institution, was evidently aware of at least two differences between the species. In 1934 on the label of a specimen from Moca, Dominican Republic, which he identified as *scrutator*,

TABLE 2
DIAGNOSTIC CHARACTERS OF TWO SPECIES OF *Rhinostomus*

	<i>oblitus</i>	<i>scrutator</i>
Range	Islands of Cuba and Haiti; ? Mexico	Islands of Haiti and ? Montserrat
Hairs of elytral intervals	Emerging from flat punctures; those of male very long and wispy	Emerging behind small, tomentose mounds (visible at $\times 32$ power); hairs shorter than interval is wide
White pattern of elytra	Intervals 2, 4, 6 white throughout, either as solid lines or dots; two penultimate intervals usually solidly white (fig. 10)	No intervals entirely white, but white patches at base and before apex of elytra (fig. 11)
Antennal club	Elongate ($3\frac{1}{2}$ times longer than wide); sides subparallel; basal corneous part less than one-half of club (fig. 17)	Elongate-oval ($2\frac{1}{2}$ times longer than wide); sides more convergent to base; basal corneous part longer, extending halfway or more into spongy area (fig. 18)
Pronotum	At basal half and sides with five or more strands of setae, 12 in some females, emerging from each puncture (fig. 25)	At basal half and sides with only two or three strands of setae from each puncture (fig. 24)
Aedeagus	At apex somewhat concave medially	At apex flat

he wrote, "note antennal club and elytral vestiture." These two characters and the other characters given in table 2 present slight, but constant differences.

Three males and two females were dissected.

Rhinostomus scrutator (Olivier)

Figures 11, 18-20, 24, 41, 45, 46

Rhina scrutator OLIVIER, 1807, p. 233, Saint-Domingue; 1808, pl. 29, fig. 428; type, female, not found.

DIAGNOSIS: Very similar to *oblitus* from the Antilles, but with shorter, wider antennal club, less white on elytra, shorter elytral vestiture, and muricate, not flat, elytral punctures (see table 2).

RANGE: Haiti; all records are from the eastern half, from Santo Domingo or the Dominican Republic. One questionable specimen from Montserrat. Specimens examined, 15.

DESCRIPTION: Length, excluding beak, 15 to 30 mm. Color black with white or yellowish, opaque glaze at base and apex of elytra, extending

from about first to fourth or fifth intervals, and white glaze surrounding some interval punctures on disc and sides, but no solid white lines on outer intervals.

Eyes and beak as described for *oblitus*, but beak of male about same length as pronotum. Antenna inserted at about middle of beak, its club (figs. 18–20) only slightly compressed, sides tapering to base, spongy apical part invaded by corneous angle or wedge to at least one-half length of club. Pronotum of male slightly longer than wide, of female about as long as wide; punctation as described for *oblitus*; base slightly sinuate; vestiture of male on sides as described for *oblitus*, but near base hairs of each puncture split into only two or three strands; vestiture of female also with two or three strands. Elytra as described for *oblitus* except for presence of tomentose mound or hairy tumulus surrounding front half of each puncture, and shorter hairs (not longer than width of interval). Ventral side, femora, tibiae, and tarsi as described for *oblitus*, but inner hairs of front tibia of male extending farther to base, and denticulations shorter, often not visible from above. Aedeagus (fig. 41) as described for *oblitus*, but apex of aedeagus flat. Eighth tergum of female (fig. 46) as described for *oblitus*.

ECOLOGY: Probably this species has the same habits as those of *oblitus*, but it is much less common. Two males and a female from Moca, Dominican Republic, were collected on “palma real” (Royal Palm) by G. Russo in 1927. An unusual record is that of a specimen from Montserrat, Lesser Antilles, found “on dried herbs” in a parcel-post package intercepted on December 6, 1938, in Boston, Massachusetts (the specimen is in the United States National Museum). Certainly this species is not meaningfully associated with herbs, and it probably is not established on tiny Montserrat.

REMARKS: This species is discussed above with *oblitus*. Fahraeus (1838, p. 796), in redescribing *scrutator* for Schoenherr’s weevil work (1838), said correctly that the elytra were black with a large, subtriangular, cinereous patch on each side at the base, with more or less distinct whitish spots sowed along the intervals or striae. He did not mention the apical patch. Heyne and Taschenberg’s figure (1908) must have been drawn from a specimen of *oblitus*, as it shows full white lines on the elytra. Jacquelin-Duval (1857) was surprised that the Cuban species he was describing as *oblitus* had not been known to Schoenherr. I have seen some very old specimens from Cuba identified as *scrutator*, and I believe that the early entomologists, including Schoenherr, thought the difference in the elytral pattern was merely due to abrasion.

The only exact locality I have seen for this species is Moca, which is

in the north central part of the Dominican Republic near Santiago. The majority of specimens are labeled simply Santo Domingo. In the nineteenth century, references to Santo Domingo or Saint-Domingue probably meant the country, not the city of that name.

Four males and two females were dissected.

Rhinostomus meldolae (Pascoe)

Figures 9, 21, 29, 32, 34, 42

Rhina Meldolae PASCOE, 1887, p. 380, Andaman [Islands], Port Blair; type, male, in British Museum (Natural History), examined.

Rhina lineata DESBROCHERS DES LOGES, 1890, p. 218, Iles Andaman; type, male, said to be in author's collection, not found.

Harpacterus orientalis GÜNTHER, 1937, p. 333, fig. 7, Insel Noesa Kambangan [= Island of Kambangan, Java]; type, female, in Museum Zoologicum Bogoriense, examined. New synonymy.

DIAGNOSIS: This is the only species of the genus from the Oriental region, and the only one with uniformly, deeply reticulate pronotum. The yellow discal stripe on the third elytral interval of each elytron is diagnostic, when present. The eyes are comparatively narrower than those of other species. The male differs further by having the front tibia not only distinctly curved, but with a very long, dense fringe of golden hairs along the entire inner edge (fig. 9).

RANGE: The Andaman Islands in the Bay of Bengal, Borneo, Java, and possibly other islands. I question the locality, Darjeeling, on the label of the paratype of "*orientalis*," as this town is somewhat over 7000 feet in the foothills of the Himalayas in northern India, which is not suitable terrain if this species, like the others, inhabits palm trees. The specimen was collected by Ribbe, who could be Heinrich Ribbe, a collector and dealer of insects in Dresden, or his son, Carl, who collected in many of the islands of the Pacific. Specimens examined, six.

DESCRIPTION: Length, excluding beak, 16 to 24.5 mm. Color black with golden, tomentose, opaque spots surrounding many punctures of elytra, in some specimens some spots merged together, or on third interval, forming solid stripe; spots not necessarily the same on both sides of elytra.

Eyes as described for *oblitus*, but proportionally narrower. Beak of male (fig. 32) dentate on top; about one-third shorter than pronotum; dorsally on each side in front of and behind antennal insertion with several taller, sharper teeth; in apical half slightly concave and sparsely setose; ventrally with abundant, long (as long as depth of beak), golden hairs directed downward. Beak of female shorter than that of male; dorsally at base rather granular, but not dentate; with short longitu-

dinal depression over antennal scrobe; below not hairy. Antenna of male inserted slightly in front of middle, of female, subbasally; club elongate-oval (fig. 21), compressed, its spongy apex about one-half or slightly more than one-half length of club; second segment of funiculus one and one-half times length of third. Pronotum longer than wide, deeply, densely reticulate-punctate, each puncture with short, curling yellow hair emerging (hair scarcely longer than depth of puncture, and at high magnification seen to be split into several strands); base gently sinuate. Elytra (see above for color), striae with large, deep, quadrate, "chain-stitch" punctures; intervals laterally scalloped, somewhat uneven of surface, much wider than striae, and raised above level of striae, with single rows of widely spaced punctures, each puncture covered in front by tomentose mound or tumulus, and with curling, yellow hair about as long as width of interval, and composed of several strands. Prosternum in lateral view rather convex; ventral side and legs well punctate, with hairs in all punctures, some hairs very long, some, as those on prosternum, composed of many strands. Front and middle coxae separated by about one-fourth diameter of coxa. Front legs, especially those of male, very long; femora and tibiae strongly punctate; front tibia of male strongly curved near middle, entire inner edge fringed with dense, golden hairs at least twice as long as width of tibia; under surface of tibia with four or five or more, small, widely spaced teeth and second row of shorter hairs; other tibiae of male straight, their inner edges with short, dense hairs; middle tibia minutely dentate; female with front tibia slightly curved, short haired, and sparsely denticulate. First tarsal segment slightly longer and narrower than second, both segments wider than those of preceding species, and at apex somewhat emarginate and not at all bulbous (fig. 29); second segment at apex as wide as tibia; third segment widely dilated and deeply bilobed; first and second segments ventrally densely spongy-hairy except for narrow median glabrous line; claw segment as described for *barbirostris*. Aedeagus (fig. 42) more or less spatulate, its apex with narrow, sclerotized border. Eighth tergum of female at apex rounded-truncate, and with sparse lateral and dorsal hairs.

ECOLOGY: No information.

REMARKS: This island species agrees with *oblitus* and *scrutator* from the Caribbean islands by having white or yellowish spots or stripes on the elytra instead of being entirely black as are some of the continental species, and by having between the eyes a double carina and median depression instead of an elevated single carina. It agrees somewhat in its coloration also with *quadrisignatus*, and in its double carina between

the eyes with *thompsoni*, two species from Central and South America. The antennal club is elongate-oval as is that of *quadrisignatus*, *thompsoni*, and *scrutator* and not so elongate as that of *barbirostris*. The muricate elytral punctures are similar to those of *scrutator* and *thompsoni*. The wide tarsal segments, the short beak of the male, and the absence in the male of long hairs on the top of the beak and on the pronotum and prosternum are characteristic of the two species that follow (*thompsoni* and *quadrisignatus*), but not of *barbirostris*, *niger*, *oblitus*, and *scrutator*. *Rhinostomus meldolae* agrees, however, with the four preceding species in the long front legs and the dentate beak of the male, also in the more widely spaced coxae. This species (see discussion of the genus above), seems to be intermediate between those that precede and those that follow.

Although I have not seen the type of *lineata* Desbrochers des Loges (it was not found in the museum in Paris), I am quite certain that it is the same species as *meldolae*. Lepesme (1947, p. 629) had already synonymized it in his key, without further comment. In the first place it would be strange to find two such striking species in the Andaman Islands; secondly, Desbrochers des Loges did not mention Pascoe's species, which was described three years previously, so he probably did not know of it; and thirdly, both authors described the diagnostic curved front tibiae of the male with their fringe of long, golden hairs, the relatively short beak, the reticulate pronotum, and the yellowish tomentose stripes and spots of the elytra. Both authors also mentioned female specimens. Desbrochers des Loges' description is very detailed and I have compared the holotype of *meldolae* directly with it. Pascoe did not mention the infrarostral hairs in his short description, but they are present on his holotype. The holotype is only 16 mm. excluding the beak, whereas Desbrochers des Loges stated that his two specimens were 20 and 22 mm.

Harpacterus orientalis Günther from Java, of which I have examined the type and paratype (both females of about 19 mm.), is also a synonym of *meldolae*. Günther (1937) questioned whether his *orientalis* belonged in the genus *Harpacterus*, which he knew from the description only, and if he had had a male specimen, he probably would have recognized its relationship with the other *Rhinostomus*.

The yellow markings of the elytra differ slightly in the six specimens I have seen. The discal spots on the third interval are merged into a solid stripe in the type of *meldolae* (Andaman Islands); they are merged only in about the basal third in two specimens (Andaman Islands) and in the type of *orientalis* (Java); they are separated into distinct spots in the paratype of *orientalis* (Darjeeling), and in a specimen from Borneo.

All specimens have a humeral spot and various other scattered spots on the intervals.

One male and two females were dissected.

Rhinostomus quadrisignatus (Boheman)

Figures 13–15, 22, 30, 36, 37, 43

Harpacterus quadrisignatus BOHEMAN, 1845, p. 208, Brazil; type, probably female, in Naturhistoriska Riksmuseum, Stockholm, examined.

Harpacterus ebeninus BOHEMAN, 1845, p. 207, Novum Friburgum [=Nova Friburgo, Rio de Janeiro] Brazil; type in Hope Department, Oxford University Museum. New synonymy.

DIAGNOSIS: This species and *thompsoni* differ from the other species by having the front coxae narrowly, not widely, separated, and the secondary sexual characters less marked. This species differs from *thompsoni* by having a single glabrous carina between the eyes instead of two hairy carinae; the pronotum punctate but not granulate; the elytra spotted with white but not granulate; and the claw segment inserted near the middle, not the apex, of the third segment.

RANGE: South America from French Guiana and eastern Brazil to western Brazil, Ecuador, and Peru. Specimens examined, 23.

DESCRIPTION: Length, excluding beak, 10 to 20 mm. Color black, with white or yellowish, tomentose, opaque glaze in two stripes on pronotum (not present in all specimens), and on elytra in round or triangular, scattered spots surrounding punctures, the glaze merged into solid patches at base of fifth, sixth, and seventh intervals and at apex of fourth to seventh intervals, (figs. 13–15) thus forming four large spots.

Eyes narrowly separated above by single, feebly elevated carina, or by distance of less than one-half of width of scape at middle. Beak of male either one-third shorter than pronotum or nearly of same length; dorsally with apical part carinate medially, in some specimens feebly carinate laterally, punctate throughout. Beak of female shorter than pronotum, more tumid over antennal insertion where canaliculate longitudinally, and punctate; dorsally in apical half glabrous and impunctate at middle. In both sexes undersurface of beak punctate. Antenna of male inserted at or slightly in front of middle, of female slightly behind middle; club elongate-oval, compressed slightly, with apical spongy part, at least on outer (distal) side, one-half or two-thirds of length of club; second segment of funiculus one and one-half times length of third. Pronotum slightly longer than wide, sides gently arcuate from base to apex; punctate rather densely except for narrow, impunctate

median line of varying length; some specimens with median impunctate area slightly elevated, and with yellowish glaze in two irregular, rather eroded lateral stripes; base slightly sinuate. Elytra (see above for color), striae punctures dense, deeply impressed, appearing more or less quadrate; intervals flat, variable in width, but wider than striae and with scattered, tiny punctures with or without whitish glaze surrounding them. Prosternum convex; under surface and legs rather densely punctate, less dense at center of metasternum; abdomen at apex truncate and slightly hairy. Front coxae virtually touching, separated by narrow line, middle coxae separated by one-third or one-fourth of diameter of coxa. Tibiae virtually straight, but inner edge of front tibia slightly incurved, and with three or more denticules, outer edge of all tibiae feebly carinate. First segment of tarsus about one-third longer than second; third segment widely dilated, deeply bilobed; first two segments below with only median line hairless; claw segment inserted near middle of third. Aedeagus (fig. 43) at apex rounded-acuminate, with suggestion of blunt projection at middle; apical sclerotized border very wide. Eighth tergum of female at apex rounded, with hairs at apex and sides of apex.

ECOLOGY: No information.

REMARKS: Champion, in his discussion of the similarity of the white maculate elytra of *Yuccaborus* LeConte and "*Harpacterus*," remarked (1910, p. 175) that "to judge from the supposed type of *H. ebeninus* Boh., in the Sommer collection, it is probable that it will prove to be a discoloured greasy example of *H. quadrisignatus*." His supposition is proved now to have been correct. R. T. Thompson of the British Museum (Natural History) has found this type (No. 1440 in the Hope Department of Oxford) and has kindly compared it for me with specimens I had compared with the type of *quadrisignatus* in Stockholm. Thompson found that *ebeninus* is a synonym, and that it differs from *quadrisignatus* only by having a very minute sulcus on the glabrous carina between the eyes.

The white-spotted elytra of *Yuccaborus frontalis* (fig. 8) lack the large white basal and apical patches characteristic of *quadrisignatus*. The whitish glaze in both forms appears to be the same as that present on the elytra of *Rhinostomus meldolae*, *oblitus*, *scrutator*, and *thompsoni*, but the additional hairy granules of *scrutator* and *thompsoni* are not found in the other species.

Neither Schoenherr (1845) in his description of the genus *Harpacterus*, nor Boheman (1845) in his description of the two species included (*ebeninus* and *quadrisignatus*) mentioned any differences between the sexes. Lacordaire (1866), who had only "a small number" of specimens, thought

that probably both he and earlier authors had males only. The sexes are readily distinguished, as the front half of the beak of the female is dorsally smooth and convex, whereas that of the male is medially carinate and punctate. In addition, the antenna of the male is inserted at or in front of the middle of the beak and that of the female at or behind the middle. Another character, which I have found on five males and no females, of specimens examined, is a shiny, ebony-black, elongate, impunctate patch on the outer side of the front femur. A similar patch is present in some males of *thompsoni*.

One of two females from "Brazil," collected by Bates, a male from "Peru," a male from Pompeya, Ecuador (on the Napo River, 40 km. from Coca), and a male and female from Macas, farther south in Ecuador, differ somewhat from the other specimens examined from Brazil and French Guiana. Possibly these specimens represent a distinct species; they may be the "allied undescribed form" from Ecuador mentioned by Champion (1910, p. 175). Possibly they are a western subspecies characterized by having two lateral whitish yellow vittae on the pronotum (almost exactly as in one of the subspecies of *Yuccaborus frontalis*), and the punctures of the pronotum distinctly rougher and more confluent than those of other specimens. The males have a longer beak than that of other males (as long as the pronotum) with the antennal groove farther front (figs. 36, 37), and the females have the swelling over the antennal groove, in profile, very feeble and in dorsal view nearly straight, not sinuate. Other characters, including the aedeagus, appear to be the same.

Five males and four females were dissected.

***Rhinostomus thompsoni*, new species¹**

Figures 12, 23, 31, 33, 35, 44

TYPE MATERIAL: Type, male, Barro Colorado Island, [Canal Zone, Panama], July 30, 1924, W. M. Wheeler, collector, and one female paratype with the same data in the Museum of Comparative Zoology, Cambridge; one male paratype with the same data in the American Museum of Natural History; one male paratype, same locality, but dated May 19, 1967, D. M. DeLong and C. A. Triplehorn, collectors, and one female, Santa Fe, Darien, Panama, May 25, 1967, same col-

¹ I take pleasure in naming this interesting species for R. T. Thompson, curculionidist at the British Museum (Natural History), without whose energetic help in finding and examining for me the type of *ebeninus*, I would have misidentified this new species as *ebeninus* Boheman.

lectors, both in the Ohio State University, Columbus; one female paratype, Margarita, Canal Zone, Panama, May, 1960, S. Breeland, collector, in the collection of Mrs. Anne T. Howden, Ottawa, Canada; from Colombia two female paratypes, one, Alto Rio Opon, 900 meters, April 16, 1948, Richter, collector, in the American Museum of Natural History, and one, Rio Yurumangui, west slope of the Cordillera, in Muséum National d'Histoire Naturelle, Paris; from Ecuador, a male, La Chima, 1893, M. de Mathan, collector, in the same museum.

DIAGNOSIS: Agreeing with *quadrisignatus* and differing from other species by having front coxae very narrowly separated, beak of male not dorsally dentate, and being generally smaller. Differing from *quadrisignatus* by having no white on elytra, by having eyes separated by a depression between two hairy carinae, pronotum and elytra with hairy mounds or granules surrounding punctures, aedeagus truncate at its apex, and third tarsal segment shallowly, not deeply, bilobed (fig. 31).

RANGE: From the Canal Zone, Panama, south to Colombia and Ecuador. In addition to the type series, a male without locality data has been examined in the Museum of Comparative Zoology, Cambridge. The locality of one of the paratypes, Santa Fe, does not appear on most maps; Triplehorn wrote me that Santa Fe is at sea level about 28 kilometers directly north of La Palma in northern Darien, near the Sabana River.

DESCRIPTION OF TYPE, MALE: Length, 12 mm. Color black, but more than half-covered with buffy, muddy spots of opaque glaze around punctures, and hairy mounds or granules rising above punctures.

Eyes narrowly separated above by interocular canal bordered by two hairy carinae or elongate tubercles, distance between eyes equal to width of scape at about middle. Beak (fig. 33) slightly longer than pronotum, with dense punctures ringed with hairs; dorsally, between base and antennal groove, subcylindrical; between groove and apex, surface flattened and with three glabrous carinae; ventrally in front half with hairs as long as apical funicular segments. Antenna inserted in front of middle of beak; club (fig. 23) elongate-oval, compressed slightly, with apical spongy part on outer side about one-half of length of club; second segment of funiculus one and one-half times length of third. Pronotum scarcely longer than wide, widest in front of middle where sides arcuate to apex and rather sinuate to base; densely punctate except on median impunctate line; punctures situated within hairy craters or mounds; base truncate. Elytra, strial punctures dense, hairy, scarcely impressed, round; intervals flat, many times wider than striae, their punctures scattered, resembling those of pronotum by being set within hairy granules (two or three granules may be close together either longitudinally or horizontally), area around granules composed of flat, opaque glaze. Pros-

ternum convex, ventral surface and legs with dense granular punctures as on pronotum; front femur on outer side with glabrous, black, elongate patch; abdomen at apex truncate and slightly hairy. Front coxae nearly touching, middle coxae separated by space only slightly wider. Tibiae slightly curved; on inner edge not dentate, on outer edge scarcely carinate, if at all. Tarsus, first segment about one-third longer than second; first two segments below with only median line hairless; third segment widely dilated on front and middle legs, but on hind legs scarcely wider than preceding segments, on all legs shallowly bilobed; claw segment inserted near apex of third. Aedeagus (fig. 44) at apex truncate; apical sclerotized border very wide.

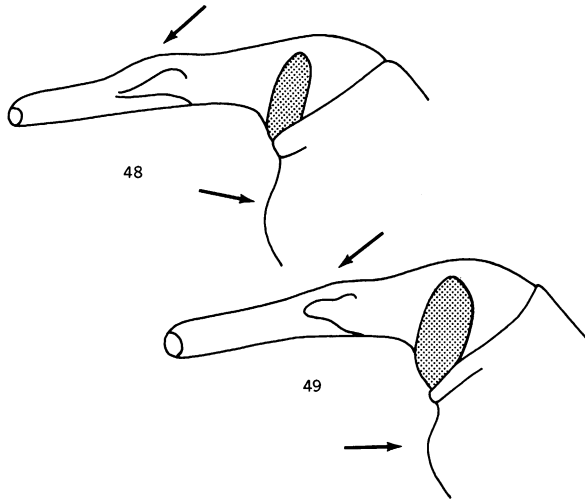
VARIATIONS FROM TYPE: On two rather greased paratypes the granules are grayish instead of buffy; in a specimen without locality the carinae between the eyes are worn down nearly flat, but the depression between them can be seen nonetheless. The pronotal punctation varies somewhat among the specimens. The paratypes range in size from 10 to 15 mm. One of the males (Barro Colorado) lacks the shiny patch on the front femur. All the females lack this patch. Females differ from males by having the beak shorter (the same length as the pronotum), more tumid over the antennal insertion (fig. 35), the tumid area being furnished dorsally with a carina sunk within a slight, flattish depression; in front of the tumid area the beak of the female is not carinate, but can be punctate or impunctate, and it is hairy laterally as well as ventrally. The antennae are situated in front of the middle of the beak, but relatively not so far front as those of the male. The eighth tergum has many rows of abundant hairs at the apex.

REMARKS: The excrescences on the dorsal surface, which may be called tomentose mounds, hairy spots, hairy granules, muricate punctures, or miniature craters, are of the same kind as those on the elytra of some species of *Mesocordylus*, especially *M. porriginosus*. They are proportionally larger, more hairy, and more distinct than those of *Rhinostomus scrutator*, resembling more those of some specimens of *R. meldolae*.

The depression and carinae between the eyes are present also in *meldolae*, *oblitus*, and *scrutator*, but in those species the carinae are glabrous, not setose. All other species of the genus have a single, glabrous carina.

The secondary sexual characters of this species and of *quadrisignatus*, to which it appears most closely related, are less marked than those of the remaining species. Thus the male lacks dorsal dentations on the beak (minute ones are visible in some specimens), has no striking long hairs on the beak or prosternum, and does not have such markedly long front legs.

Four males, including the type, and two females were dissected.



FIGS. 48, 49. *Yuccaborus frontalis*, showing insertion of antenna on beak, and convex prosternum. 48. Male. 49. Female.

GENUS *YUCCABORUS* LECONTE

Yuccaborus LECONTE, 1876, p. 133. Type species, by monotypy, *Rhina frontalis* LeConte, 1874.

DIAGNOSIS: The single polytypic species differs from all others of the Sivalini by having on the third tarsal segment, below, two round, well-defined, hairy tarsal pads at the apex only, and by having the middle tibia at the apex denticulate (fig. 55). The eyes above are widely separated as in other genera of the tribe, not virtually contiguous as in *Rhinostomus*. Agreeing with *Rhinostomus* and differing from the other genera by having dilated, bilobed third tarsal segments, no postocular lobe, the tibiae on the inner edge denticulate, and the mandibles curving outward and laterally trilobed.

DESCRIPTION OF GENUS (Characters of tribe not repeated): Length, excluding beak, 6 to 18 mm. Surface dull or shining, color black or dark red, with or without whitish or yellowish, opaque spots around punctures of elytra and forming stripe on each side of pronotum. Punctures with inconspicuous setae.

Eyes widely separated above. Mandibles, viewed from above, curving outward, showing palpi within (fig. 3), laterally trilobed, lobes on inner surface convex, on outer surface concave. Beak slightly shorter than pronotum; straight, subcylindrical; coarsely, densely punctate, but in some specimens with smooth space dorsally near apex; dorsal apex truncate

with at middle slight projecting point; scrobe short, descending abruptly to under surface of beak, but vaguely defined posteriorly. Antennal club (figs. 51-53) elongate-oval, compressed, its apical spongy part varying from one-third to three-fourths of length of club (depending on which surface of club is viewed); scape widened to apex, extending to front border of eye, about as long as funiculus; second funicular segment longer than third; segments three to six elongate.

Pronotum, postocular lobe absent; base margined and truncate. Scutellum more or less bluntly shield-shaped, about as wide as long. Elytra about one and one-half times length of pronotum, subcylindrical. Prosternum very convex. Coxae strongly punctate, hairy; front coxae contiguous, middle coxae scarcely separated. Abdomen with suture between first and second segments straight.

Femora and tibiae linear, front tibia on inner edge finely dentate or crenulate; middle tibia at apex with four or fewer denticulations. Tarsi, first and second segments on under surface at middle concave, and glabrous except for dense lateral hairs; third tarsal segment widely dilated and deeply bilobed, its under surface hairy at apices of lobes only; claw segment inserted near middle of third. Aedeagus with lateral line dividing dorsal and ventral surfaces, its two long apodemes attached dorsally to base of aedeagus; no flagellum present. Eighth tergum of male at apex truncate, hairy.

SEXUAL DIMORPHISM: The only secondary sexual difference seems to be that the antenna of the male is inserted farther forward on the beak, thus the anterior border of the antennal groove is slightly in front of the middle of the beak of the male, whereas that of the female is slightly behind the middle (figs. 48, 49).

DISTRIBUTION AND ECOLOGY: The geographic range of the only species (*Yuccaborus frontalis*) extends (fig. 50) from southern California and Nevada and northern Baja California eastward to southeastern Texas, thence south in eastern Mexico to Veracruz and Puebla, also the state of Zacatecas in western Mexico, and (one record only) Guerrero in southwestern Mexico; also southern Baja California. There is a large intervening area between Zacatecas and the southwestern United States from which I have no records although there is no apparent reason why there could not be some. This wide hiatus occurs also in the species *subparallelus* of the related genus *Orthognathus*, which has been taken in southern Arizona and from Durango, Mexico, southward, but not in the most northern states of Mexico. Elbert L. Sleeper said (in a letter) that he has a very large number of weevils from Baja California Sur that have the same distributional pattern in Mexico as *Y. frontalis*, and that he wonders what routes these weevils use to get into Baja California.

The host plant is *Yucca* (Spanish bayonet, or beargrass), of which there are more than 40 species in North America. The only exact name I found for the species is *Yucca valida* on the label of a female specimen from San Ignacio, Baja California, collected by Michelbacher and Ross in June, 1938. The type of *frontalis* was taken under *Yucca* in the Mohave desert of California. Wickham (1896, p. 123) found "numerous pupae and adults with one larva in dead *Yucca* [at Brownsville, Texas]. They occur in the decaying portion immediately underlying the old bases of the leaves." The specimen Anderson (1948) used for his larval studies was also from Brownsville, in *Yucca*, "larvae in galleries between bark and interior, the galleries similar to those of *Dendroctonus* . . ." A number of specimens from southern California are labeled "in *Yucca*." The habits are probably the same as those described above for *Rhinostomus barbirostris*, and probably *Yuccaborus* is also nocturnal; many specimens were collected at lights. A number of specimens were collected in Joshua Tree National Monument, California, by E. L. Sleeper and S. L. Jenkins in ground traps or pitfalls.

GENERAL REMARKS: This genus is very similar to *Rhinostomus* (see diagnosis). In fact, LeConte (1874) described his *frontalis* in that genus (as "*Rhina*"). Later, in 1876, he proposed a new subfamily, Rhinidae, and a new genus, *Yuccaborus*, for *frontalis*. He considered *Yuccaborus* allied to *Rhina* and *Harpacterus*, an opinion shared by Champion (1910). Casey (1892, p. 687) remarked that, "This singular genus is unmistakably allied to *Rhina*, being in fact nearly identical in rostral structure, but differs in many important features, among which may be mentioned the widely separated eyes, much more abbreviated, dilated and semi-corneous antennal club, deflexed beak, short legs, and smaller size of the body." The peculiar flat, white, waxy spotting of the elytra characteristic of some populations of *frontalis* is the same as that found in *Rhinostomus quadrisignatus*, *oblitus*, and *scrutator*.

A total of 266 specimens of the genus have been examined, as well as the types of Casey. The two cotypes of LeConte's *frontalis* were compared with my specimens by John F. Lawrence of the Museum of Comparative Zoology.

Since the description of *frontalis*, Casey (1892, 1904) reviewed the genus, adding three species, and giving a key. Champion (1910) reviewed the species found in Mexico. Sleeper (1960) and Tanner (1966) discussed chiefly *frontalis* and *grossus*, mentioning *lentiginosus* and *sharpi*. I consider these four names as representing but one species composed of two subspecies.

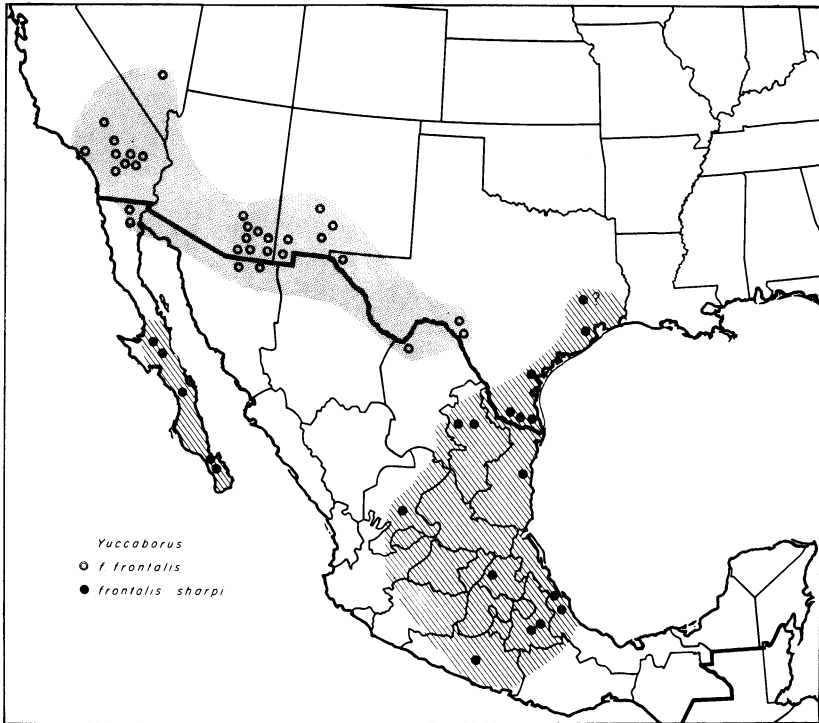


FIG. 50. Distribution of the subspecies of *Yuccaborus frontalis*.

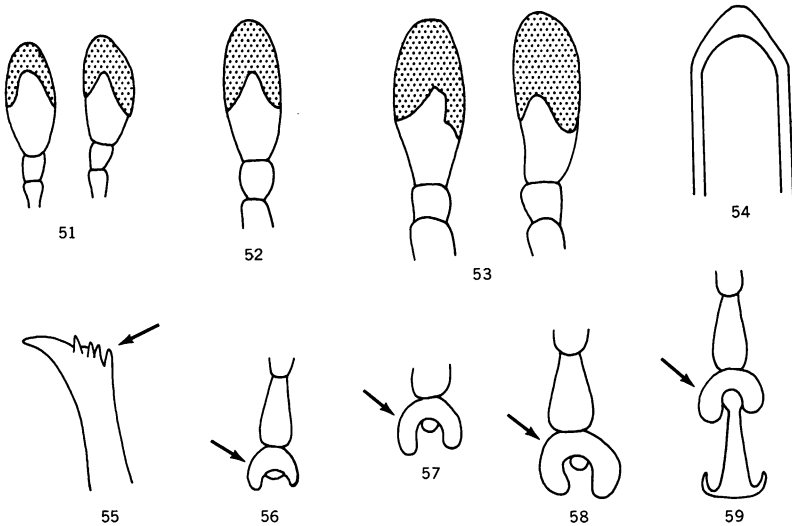
Yuccaborus frontalis

Figures 8, 48-59

The diagnosis of the species, as well as the range, ecology, and description are the same as that for the genus. Additions for the species are as follows: Pronotum about as long as wide (without measurement it may appear longer than wide); sides gently arcuate from base to apex; some specimens with impunctate space at middle, elevated or not, some with space or fovea on each side of middle; punctures often confluent, denser on sides than at middle, coarse, as large as, or larger than, punctures of elytral intervals. Elytra, intervals either flat or slightly convex, in some specimens elevated over sunken striae, in some much wider than striae, in some scarcely wider; striae punctures either feebly or deeply impressed, in majority of specimens dense; punctures of intervals widely spaced in single, double, or irregular rows, punctures appearing smaller when surrounded with whitish, waxy glaze. Aedeagus with apex more or less triangular (fig. 54).

REMARKS: This form is composed of beetles of two types that represent one another geographically and are either conspecific or are allopatric species. I believe they are the former. In one type (n nominate *frontalis*, type locality, Mohave Desert, California), which is usually entirely black or dark red, the range extends in the southwestern United States from western Texas west to California, and also slightly south of the United States-Mexican border (fig. 50). The other form (*sharpi*, type locality, Guerrero, Mexico), which is black or red, is spotted with white on the elytra, occurs in Baja California, and central and southern Mexico, north, on the Caribbean side, to southeastern Texas; also in western Mexico in the state of Guerrero. Present knowledge suggests that the two forms do not meet at any point. The only character by which I can distinguish them are the white maculations of the elytra of *sharpi*, (fig. 8) but this character is not constant. For instance, after soaking the specimens in carbon tetrachloride, I found that a few nominate *frontalis* (one each from White Sands and Granite Pass, New Mexico, several from Portal and Mt. Washington in southern Arizona, and three from south of the border at Agua Prieta, Sonora, and El Progreso, Baja California) do show either faint whitish spots on the sides of the elytra (visible under a lighted microscope), or only three or four distinct white spots on the sides toward the apex. No specimens of nominate *frontalis* have been seen with dense, plainly visible spots, as in *frontalis sharpi*. In some specimens of the latter, however, the spots may not show unless the elytra are first degreased, or the spots may be dense but faint. These spots, when faint, are seen best if the specimen is tipped forward or backward. They are composed of an opaque, waxy glaze which appears to be the same as that found on the elytra of *oblitus* and *scrutator* of the related genus *Rhinostomus*; they are not tomentose, buffy spots as in species of *Mesocordylus*.

Previous authors (Casey, 1892, 1904; Sleeper, 1960; and Tanner, 1966) have used various characters to distinguish three or four species in this complex. These include the color (black or reddish), the surface (shining or dull), the punctuation (coarse and deep, or fine and shallow), the sculpture of the elytra (width and height of the intervals, and the depth of the striae; also the coalescence of some striae), the shape of the elytra (elongate or short, with the humerus tumid or not), and the shape of the pronotum (long or short). I have examined all these characters on about 200 specimens and can find little correlation or constancy. The characters vary individually and occur at random in all populations or are fairly constant in one population but not in another. Thus the punctuation of the elytral intervals is uniformly fine and small in populations



FIGS. 51-53. Variation in spongy apex of antennal club of *Yuccaborus frontalis*. 51. Nominative *frontalis*, Los Angeles, California, inner face on left, outer face on right. 52. Nominative *frontalis*, Joshua National Monument, California, outer face; characteristic also of *f. sharpi*, Jalapa, Mexico. 53. *Y. f. sharpi*, Zacatecas, Mexico, inner face on left, outer face on right.

FIG. 54. Apex of aedeagus of *f. sharpi*, Brownsville, Texas.

FIG. 55. Apex of middle tibia of *Y. frontalis*.

FIGS. 56-59. Variation in shape of third segment of hind tarsus. 56. Joshua National Monument (*f. frontalis*). 57. Santa Rita Mountains, Arizona (*f. frontalis*). 58. Jalapa, Mexico (*f. sharpi*). 59. Brownsville, Texas, showing also claw segment (*f. sharpi*).

with white spots, chiefly because the white glaze covers most of the punctures, but in other populations the punctuation of the intervals and the striae varies considerably, individuals with fine or coarse punctuation occurring in the same localities. Curiously enough, the only character (the elytral spotting) by which I have been able to distinguish two forms has been passed over in favor of some of the characters mentioned above.

Several additional characters have been considered, but they appear to be variable throughout the range of the species. Thus on the ventral side, the facets of the eyes come closer together in some individuals; the third tarsal segment (figs. 56-59) varies in shape and in the depth of the emargination; in the antennal club (figs. 51-53) the relative size of the spongy apex to the sclerotized base varies slightly. The length of the second funicle of the antenna is especially variable. I found only slight variations in the spermatheca and the aedeagus.

With such variability, it is not surprising that more than one species was described, and the types of these forms certainly differ from one another. The type of *frontalis* LeConte (Mohave Desert) is small (8 mm.), reddish, with smooth elytra, the elytral intervals are wide and flat, the striae narrow, the punctures fine and shallow. The type of *grossus* Casey (El Paso) is large (about 15 mm.), black, shining; the elytra are extremely densely, coarsely punctate, with narrow, sharply elevated intervals and large, deep striae punctures, some intervals having only one row of punctures; the pronotum has a reddish tinge, and two large foveae on each side (for some reason these are not mentioned by Casey). The paratype of *grossus* (Arizona) looks quite different from the type, being smaller (12 mm.), without pronotal foveae, and with sparser, fine punctures on the elytral intervals. The type of *sharpi* Casey (Guerrero, Mexico) is about 10 mm., is finely punctate and smooth as is *frontalis*, and rather bright red in color; it is somewhat shorter and stouter than *frontalis*, with less tumid humerus on one side of the elytra where the fifth and sixth striae are scarcely coalescent at their base. This specimen, even after a thorough degreasing, shows no white or yellow spots (see *sharpi* below). The type of *lentiginosus* Casey (Brownsville, Texas) is also small and reddish, but the elytra are covered with yellowish spots, and their punctures are fine. Many specimens from Mexico with these typical spots are much larger, are black, and have a coarsely punctate pronotum with impunctate foveae as in the type of *grossus*.

I measured 91 specimens from Mexico, Texas, Arizona, and California, and found that the average length for 56 spotted specimens was 12.4, and for 35 immaculate specimens, 12.7 mm. The largest individuals I have seen (18 to 20 mm.) are two females (*frontalis sharpi*), from Hidalgo and Weslaco, Texas, localities close to Brownsville. The average length for this species is only 10 mm. for males and 11 mm. for females. An equally large female (nominative *frontalis*), comes from Portal, Arizona, and large examples also come from southern and Baja California. The largest specimens seen by Sleeper (1960) were from southern Arizona.

KEY TO THE SUBSPECIES OF *Yuccaborus frontalis*

Elytra and pronotum black or dark red; southwestern Texas and adjacent extreme northern Mexico west to California and extreme northern Baja California *frontalis frontalis* LeConte
 Elytra maculate with white or yellowish spots surrounding all punctures, but spots not distinct in all specimens¹; pronotum in some specimens whitish on

¹ Spots on greased specimens can be made visible by wetting with a brush or by soaking in carbon tetrachloride.

sides of disc; southeastern Texas south in Mexico to Veracruz and west to Guerrero and central and southern Baja California
 *frontalis sharpi* Casey

Yuccaborus frontalis frontalis (LeConte)

Rhina frontalis LECONTE, 1874, p. 70, Mohave Desert [California]; cotypes, both female, "Cala" in the Museum of Comparative Zoology, Cambridge.

Yuccaborus grossus CASEY, 1892, p. 689, El Paso, Texas; type, male, "Texas," in the United States National Museum, examined. New synonymy.

DIAGNOSIS: Differing from more southern subspecies (*sharpi*) by having elytra immaculate. (For range and further discussion, see remarks on the species; 182 specimens examined.)

REMARKS: A species of another genus (*Scyphophorus yuccae* Horn) and a different tribe (Rhynchophorini) occurs in some of the same places as does nominate *frontalis*, and breeds also in *Yucca* plants, but it is apparently more restricted, being found chiefly in California, rarely in the adjacent states. The two species of *Scyphophorus* resemble *frontalis* in their black coloration and their great variability in size and sculpture. Eight males and 10 females were dissected.

Yuccaborus frontalis sharpi Casey

Yuccaborus sharpi CASEY, 1892, p. 688, Guerrero, Mexico; type, male, "Guer," in the United States National Museum, examined.

Yuccaborus lentiginosus CASEY, 1904, p. 324, Brownsville, Texas; type, male, in the United States National Museum, examined. New synonymy.

DIAGNOSIS: Differing from more northern subspecies (*frontalis*) by having maculate elytra. (For range and further discussion, see remarks on the species; 89 specimens examined.)

REMARKS: Champion (1910, p. 175) wrote that he could not separate his single specimen of "*lentiginosus*" from Orizaba, Veracruz, from a series from Brownsville, Texas, sent to him by Wickham. He did not know *sharpi*. His illustrations (*loc. cit.*, pl. 8, figs. 19, 19a) show the entire weevil and a detail of the head and beak.

It is unfortunate that the name *sharpi* has to be used for this subspecies instead of the more familiar *lentiginosus*. In addition, Casey's type of *sharpi* has no spotting on the elytra, whereas his type of *lentiginosus* and virtually all other individuals of this subspecies have the characteristic spots (Miss Rose Ella Warner was kind enough to degrease the type specimen for me).

As Guerrero is so far south, it occurred to me that possibly there was an error in the locality and that *sharpi* might belong with the more northern nominate *frontalis*, which has no spots (Casey gave Guerrero,

Mexico, in the text, but the type has only "Guer"). However, upon my inquiry about the collector of the type, O. T. Baron, Miss Warner referred me to an account of his life by Brown (1965) in which it is stated that Baron did spend some time in Chilpancingo, Guerrero, in 1885. Therefore the locality is probably correct. There is a further possibility, namely, that *sharpi* is a distinct species because of its less tumid elytral humeri, but this character is apparently due only to the coalescence or noncoalescence of the fifth and sixth striae that cross the humerus, and it is quite variable.

Eight of each sex were dissected.

SPECIMENS EXAMINED

For convenience, the species, as well as the countries under each species, are listed alphabetically. In the parentheses the name of the collector, if known, is followed by the letters indicating the institution or individual to which the specimens belong. These letter symbols are as follows:

- A.M.N.H., the American Museum of Natural History
- A.U.C., Atlantic Union College, South Lancaster, Massachusetts
- B.M., British Museum (Natural History)
- C.A., the California Academy of Sciences, San Francisco
- C.N.C., Canadian National Collection, Ottawa
- C.O'B., Charles O'Brien, University of California at Berkeley, private collection
- D.G.K., David G. Kissinger, South Lancaster, Massachusetts, private collection
- E.L.S., Elbert L. Sleeper, Long Beach, California, private collection
- F.M., Field Museum of Natural History, Chicago, Illinois
- H.H., Henry and Anne Howden, Ottawa, Canada, private collection
- M.C.Z., Museum of Comparative Zoology, Cambridge, Massachusetts
- M.N.H.N., Muséum National d'Histoire Naturelle, Paris
- M.Z.B., Museum Zoologicum Bogoriense, Java
- N.R., Naturhistoriska Riksmuseum, Stockholm
- O.S.U., the Ohio State University, Columbus
- P.B., Padre Pio J. Buck, Porto Alegre, Brazil, private collection
- S.M.T., Staatliches Museum für Tierkunde, Dresden
- T.A.M., Texas Agricultural and Mechanical College, College Station
- U.C.B., University of California at Berkeley
- U.M., University of Michigan, Ann Arbor
- U.S.N.M., the United States National Museum, Smithsonian Institution, Washington, D. C.
- U.Z.M., Universitetets Zoologiske Museum, Copenhagen
- Z.M.B., Zoologisches Museum, Berlin
- Z.S.M., Zoologische Staatssammlung, Munich

GENUS *RHINOSTOMUS* FABRICIUS*Rhinostomus barbirostris* (Fabricius)¹

Argentina: Buenos Aires, 1 ♂, 1 ♀. *Bolivia*: Coroico, 2 ♂; Rio Yacuma, Santa Rosa, 2 ♂; San Ernesto, 1 ♂; Santa Cruz de la Sierra, 7 ♂, 1 ♀. *Brazil*: 13; Amazonas: 2 ♂, 1 ♀; Flores near Manaus, 1 ♂, 1 ♀; Rio Jurua, 1 ♂; Rio Madeira to Abuna, 3 ♀; Rio Madeira to Mamore, 1 ♂, 1 ♀; Manaus, 1; Benjamin Constant, 9 ♂, 3 ♀; Uypiranga, Rio Negro, 1 ♂, 1 ♀. Bahia: 4 ♂, 4 ♀. Espirito Santo: 5; Matilde, 1 ♂. Mato Grosso: Rio Verde, 1 ♂; Porto Velho, Rio Tapirape, 1 ♂. Para: Lower Amazon, Parana do Buyussu, 1 ♂; Soure Marajo, 1 ♂. Paraiba: Independencia, 1 ♂. Pernambuco: 1 ♂. Rio Branco: Mt. Roraima, 1 ♂. Rio Grande do Sul: Porto Alegre, 4 ♂, 2 ♀; Santa Rosa, 1 ♂; Cruz Alta, 1 ♀. Rio de Janeiro: Porto Alegre, 1 ♀. Santa Catarina: 1 ♂, 3 ♀; Cauna, 2 ♂, 2 ♀; Corupa, 1 ♂, 1 ♀; Rio Vermelho, 11 ♂, 9 ♀. São Paulo: 1 ♂; Piracicaba, 3 ♂, 1 ♀; Campinas, 3 ♂; Guarujá Island [opposite Santos], 1 ♀. Amazonas or Para: Rio Yaro and Rio Purus, 1 ♂. State?: Sete Lagoas, 3 ♂, 3 ♀; Cayñai, 3 ♂. *British Honduras*: Middlesex, Stann Creek District, 1 ♂; M-tee District, 7; Punta Gorda, 1 ♂, 1 ♀; Stann Creek Valley, 1 ♀; Toledo, 1 ♂. *Colombia*: 10; Bogota to Muzo, 1 ♂; Ibaguè, 4 ♂, 2 ♀; Lake Callego, 1 ♂; Lake Sapatoza Region, Chiriguana District, 1 ♂; Magdalena Valley, El Banco, 2 ♂; Mine Purino, 1 ♀; Rio Frio, 2 ♂, 1 ♀; Rio Micay, 1 ♀; Rio Guayuriba, Meta, 1 ♀; Remolino to Magdalena, 2 ♂; Santa Marta Mts., Valencia, 1 ♀; State of Darien, 1 ♂. *Costa Rica*: Esquinas, Puntarenas, 3; Golfito, Puntarenas, 2; Hamburg Farm, 1 ♂, 1 ♀. *Ecuador*: 3 ♂; Aguamo, 1 ♀; Balzapamba, 1 ♀; Balzar, 1 ♀; Macas, 1 ♂; Quito, 2 ♂; Santa Inez, 1 ♂; Zatzayacu, 1 ♂. *French Guiana*: Cayenne, 12; Roches de Kourou, 3 ♂, 4 ♀; St. Jean du Maroni, 1; St. Laurent du Maroni, 1 ♂. *Guatemala*: 2; Peten, Tikal, 8 ♂, 6 ♀; Santa Clara, Sierra de la Minas, north of Cabanas, Zacapa, 1 ♀. *Guyana*: 1 ♀; Cuyuni River, Kamaria Landing, 1 ♀; Essequibo River, Moraballi Creek, 1 ♀; Kartabo District, 4 ♀; Shudihar River, 1 ♀; Tumatumari, Rio Potaro, 1 ♂, 3 ♀. *Honduras*: Lancetilla, 1 ♀; Tela, Guaimas District, 2 ♀; Zamorano, 2 ♂. *Mexico*: Chiapas: Tapachula, 4. Nayarit: Acaponeta, 1 ♂; Compostela, 1 ♀; San Blas, 1 ♂; Tepic, El Cora, 1 ♂. Oaxaca: Oaxaca, 10 ♂, 10 ♀; Tolosa, 6 ♂, 11 ♀. Quintana Roo: X-can, 1 ♀. Veracruz: Jalapa, 6 ♂, 4 ♀; Motzorongo, 2 ♂, 2 ♀; Rio Quezalapan, east of Lake Catemaco, 1 ♂. Yucatan: Chichen Itza, 1 ♀; Colonia Yucatan, 1 ♀. *Panama*: Chiriqui, 2 ♂; Barro Colorado Island, Canal Zone, 16 ♂, 18 ♀; Madden Dam, Canal Zone, 1; Margarita, Canal Zone, 1 ♂, 3 ♀; Santa Fe, Darien, 4 ♂, 5 ♀. *Paraguay*: Hohenau, 1 ♂, 1 ♀; Lambare, 1 ♀; Sapucay, 1 ♂. *Peru*: Cuzco, Marcapata, 1 ♂; Rio Oxabamba, La Merced, Chanchamayo, 9 ♂, 4 ♀; Iquitos, 3 ♂, 3 ♀; Loreto, Pucallpa, 1 ♀; Loreto, Ucayali, 1 ♂, 2 ♀; Loreto, Estiron, Rio Ampiyacu, 1 ♂; Middle Rio Ucayali, 2 ♂, 2 ♀; Mt. Alegre, Rio Pachitea, 1 ♀; Rio Abujao, 1 ♂; Rio Santiago, 1 ♂; Rio Toro, 1 ♂; Satipo, 4 ♂, 3 ♀; Upper Rio Huallaga, 1 ♀; Upper Rio Maranon, 1 ♀; Upper Rio Tapiche, 4 ♂, 3 ♀. *Surinam*: 1 ♂; Paramaribo, 1 ♂. *Trinidad*: 3 ♂, 1 ♀; Arima Valley, 2 ♀; Cumana Bay, 1; Maraval, 1 ♂. *Venezuela*: Caracas, 1 ♂; Mt. Duida, 1 ♀; Orope, Zulia, 1; Suapure, Caura River, 1 ♂, Suapure, Caura, Mt. Juajual, 1 ♂.

¹Collectors, dates, and institutions are omitted for *barbirostris*.

Rhinostomus meldolae (Pascoe)

India: Andaman Islands: 1 ♂ (type of *meldolae*, B.M.), 1 ♂ (M.N.H.N.), 1 ♀ (B.M.). Darjeeling, 1 ♀ (Ribbe, paratype of *orientalis*, S.M.T.). *Jawa*: Noesa Kambangan, Jan. 27, 1930, 1 ♀ (type of *orientalis*, Drescher, M.Z.B.). *Borneo* or *Kalimantan*: Pengaron, 1 ♀ (Doherty, B.M.).

Rhinostomus niger (Drury)

Cameroon: 13 ♂, 7 ♀; Bangwa, 1 ♀; Buea, 1 ♂; Hinterland of Jaunde [= Yaounde], 2 ♂, 3 ♀; Joko [= Yoko], 4 ♂; Johann-Albrechtshöhe [= Kumba], 7 ♂, 5 ♀; Jsongo [= Isongo], 1 ♂; Nokundange [not located], 1 ♂, 3 ♀; Nsanakang, 1 ♂; Ossidinge, 2 ♂, 1 ♀; Victoria, 1 ♂, 2 ♀ (all foregoing Z.M.B.). *Congo*: 1 ♂, 1 ♀ (B.M., Z.M.B.); Bakuba Country, 1 ♀ (B.M.); Barumbu, Aruwimi River, 5 ♂, 3 ♀ (Chesquière, B.M.); Bas-Uele District, June, 1958, 2 ♂ (F.M.); Bunia, Haut-Uele, Oct., 1936, 3 ♂ (F.M.); Ikela, 2 ♂, 5 ♀ (D.G.K.); Njam-Njam-Semnio [= Niam-Niam-Zemio], 6 ♂, 6 ♀ (Z.M.B.); Rungu [Upper Uelle], 1 ♀ (A.M.N.H.); Stanleyville, 1 ♂, 1 ♀ (Lang and Chapin, A.M.N.H.); Wamba, Haut-Uele, Nov., 1956, 2 ♂, 1 ♀ (F.M.). *Fernando Po*: 6 ♂, 1 ♀ (A.M.N.H., B.M., Z.M.B.). *Gold Coast* [= Ghana]: Aburi, 1910, 1 ♂, 1 ♀ (Armstrong, B.M.); Tafo, 1957, 1 ♀ (Eastrop, B.M.). *Guinea*: 2 ♂ (Z.M.B.). *Kenya*: Gazi, 1951, 1 ♀ (Krauss, B.M.). *Madagascar* [= Malagasy Republic]: 9 ♂, 2 ♀ (B.M., Z.M.B.); Majunga, 3 ♂, 7 ♀ (Z.M.B.); Ste. Marie, 6 ♂, 5 ♀ (U.Z.M., Z.M.B.); Tananarive, 1937, 1 ♂ (Herschel-Chauvin, Z.M.B.). *Mozambique*: Chonguene, 1905, 2 ♂ (Lady Jackson, B.M.); Tete, 1 ♂ (type of *amplicollis*, Z.M.B.); Zambesi, 1 ♂, 1 ♀ (B.M., Z.M.B.). *Nigeria*: Akassa to Asaba, 1 ♀ (B.M.); Bibundi, 2 ♂ (Z.M.B.); Ikot Ekpene, 1911, 1 ♀ (Simpson, B.M.); Ilesha, 1911, 1 ♂ (Humphrey, B.M.); Old Calabar, 3 ♂, 2 ♀ (B.M.); Umuahia, 1952, 1 ♂ (Cozens, B.M.). *Sierra Leone*: 1 ♂ (type of *afzelii*, Z.M.B.). *Tanganyika* [= Tanzania]: Dar es Salaam, 5 ♂, 3 ♀ (Z.M.B.); Mikindani, 2 ♂, 1 ♀ (Z.M.B.); Pangani, 1 ♂ (Z.M.B.); Tanga, 20 ♂, 22 ♀ (Z.M.B.); Usambara Mts., 4 ♂ (Z.M.B.); Zanzibar, 1 ♂, 1 ♀ (B.M., Z.M.B.). *Togo*: Amedzowe [not located], 3 ♂, 3 ♀ (Z.M.B.); Bismarckburg [near Yégué], 4 ♂, 3 ♀ (Z.M.B.); Misahohe, 1 ♀ (Z.M.B.). "*Deutsch Ost Africa*": 2 ♂, 2 ♀ (Z.M.B.). "*West Africa*": 1 ♂, 1 ♀ (Z.M.B.).

Rhinostomus oblitus (Jacquelin-Duval)

Cuba: 27 ♂, 14 ♀ (A.M.N.H., B.M., S.M.T., M.C.Z., N.R., M.N.H.N., U.Z.M.); Camaguey, 1 ♂ (U.S.N.M.); Baragua, Camaguey, 21 ♂, 13 ♀ (M.C.Z., U.S.N.M.); Santo Tomas, Camaguey, 1 ♂ (U.S.N.M.); Central Jaromu [or Jaronu], Camaguey, 2 ♂, 1 ♀ (M.C.Z.); Cayamas, Oriente, 1 ♂ (E. A. Schwarz, U.S.N.M.); Guantanamo, Oriente, 2 ♂ (S.M.T., Z.M.B.); Victoria de las Tunas, Oriente, 1 ♂ (F.M.); Havana, 2 ♂, 1 ♀ (Z.S.M.); Soledad, 1 ♂, 3 ♀ (M.C.Z.); Soledad, Cienfuegos, 2 ♂ (M.C.Z.); Mayari, Bay of Nipe, 1883, 1 ♂ (M.N.H.N.); Nueva Gerona, Isle of Pines, June, 1900, 1 ♀ (Palmer and Riley, U.S.N.M.). *Haiti*: 2 ♂ (S.M.T., M.N.H.N.); "Domingo," 1 ♂, 1 ♀ (S.M.T.); "S." Domingo, 1 ♂, 2 ♀ (B.M., M.N.H.N.). *Localities Doubtful*: *Mexico*: 6 (B.M., S.M.T., Z.M.B.); *Brazil*: São Paulo, 1 (Z.M.B.). *Without Locality*: 12.

Rhinostomus quadrisignatus (Boheman)

Brazil: 1 (type, N.R.); 6 (B.M., A.M.N.H., M.C.Z., U.S.N.M.). Amazonas: Tabatinga, Apr., 1959, 1 ♀ (C.O'B.); São Paulo de Olivença, 1883, 1 ♀ (de Mathan, M.N.H.N.). Rio Grande do Sul: Itapiranga, Apr., 1934, 1 ♂ (P.B.); São Leopoldo, 1 ♂, 1 ♀ (P.B.). Rio de Janeiro: 1 ♂, 2 ♀ (B.M.); Nova Friburgo, 1 ♂ (M.C.Z.). São Paulo, 1 ♀ (Z.M.B.). *Ecuador*: Macas, 1 ♂, 1 ♀ (B.M.); Pompeya, Apr., 1965, 1 ♂ (Peña, E.L.S.). *French Guiana*: St. Laurent du Maroni, 1 (M.N.H.N.). *Peru*: 1 ♂ (S.M.T.). *No Locality*: 1 ♀ (M.C.Z.).

Rhinostomus scrutator (Olivier)

Haiti: *Dominican Republic*: July, Nov., Dec., 1966, 1 ♂, 2 ♀ (Rolston, T.A.M.); Moca, 1927, 2 ♂, 1 ♀ (G. Russo, B.M., U.S.N.M.). "S. Domingo": 5 ♂, 3 ♀ (B.M., M.C.Z., M.N.H.N.). *Montserrat*: 1938, 1 ♂ (U.S.N.M.).

Rhinostomus thompsoni, new species

Colombia, Ecuador, Panama: (see under the species in the text).

GENUS *YUCCABORUS* LECONTE*Yuccaborus frontalis frontalis* (LeConte)

Mexico: Baja California: Rumarosa, July, 1963, 2 ♀ (E.L.S.); Sierra de Juarez, El Progreso, Aug., Sept., 1959, 2 ♂ (Sleeper, E.L.S.). Sonora: Agua Prieta, July, 1965, 1 ♀ (E.L.S.); Naco, 1949, 1 ♀ (A.M.N.H.). Coahuila: Campo Central, 30 miles south of Boquillas, Texas, Apr., 1945, 2 ♂ (K. Schmidt, F.M.). *United States*: Arizona: (Various dates, collectors, and institutions), 1 ♂ (paratype of *grossus*, U.S.N.M.); Chiricahua Mts., 1 ♀; Cochise Stronghold, Dragoon Mts., 3 ♂; Globe, 2 ♂; Hualpai Mts., 1 ♀; Madera Canyon, Santa Rita Mts., 6 ♂, 6 ♀; Mt. Washington, Nogales, 4 ♂, 2 ♀; Sabino Basin, Santa Catalina Mts., 1 ♂, 1 ♀; Sierra Vista, Cochise Co., 1 ♀; Southwestern Research Station, near Portal, 4 ♂, 7 ♀. California: 1 ♂ (M.C.Z.); San Bernardino Co.: Hesperia, Dec., 1963, 1 ♂ (Sage, C.O'B.); Morongo Valley, June, 1951, 1 ♀ (Bechtel, U.C.B.), July, 1958, 3 ♀ (E.L.S.); Victorville, 1 ♂ (Seton, A.M.N.H.); Randsburg, 2 (C.A.); Los Angeles Co.: Los Angeles, 2 ♂ (C.A.); San Gabriel Mts., Charlton Flat, June, 1960, 1 ♀ (West, E.L.S.); Riverside Co.: Pinon Flat, San Jacinto Mts., May, 1940, 1 ♂ (Husband, C.O'B.), and 50 ♂, 53 ♀ from the following localities in the Joshua Tree National Monument: Cottonwood Springs, Covington Flat, Eagle Mt., north side, Fried Liver Wash, Lost Horse Valley, Lost Palms, Pinyon Wells, Pleasant Valley, Quail Guzzler, Smithwater Wash, Squaw Tank, Winona (all E.L.S.). Nevada: Pahrnagat Valley, Lincoln Co., July, 1938, 1 ♂, 1 ♀ (Hubbs, U.M.). New Mexico: 1 ♀ (E.L.S.); Granite Pass, Hidalgo Co., 1 ♂ (E.L.S.); Lordsburg, July, 1956, 1 ♂ (A. and H. Howden, H.H.), Aug., 1949, 1 ♀ (Werner and Nutting, F.M.); Magdalena Mts., Aug., 1894, 2 (Snow, M.C.Z.); Organ Mts., Las Cruces, July, 1956, 1 ♂ (A. and H. Howden, H.H.); White Sands, July, 1956, 1 ♂ (A. and H. Howden, H.H.). Texas: 1 ♂ (type of *grossus*, U.S.N.M.); Del Rio, Val Verde Co., Dec., 1963, 1 ♀ (T.A.M.); El Paso, June, 1962, 1 ♂ (T.A.M.); Val Verde Co., May, 1948, 1 ♂ (Knull, E.L.S.).

Yuccaborus frontalis sharpi Casey

Mexico: Baja California: El Arco Mine, 40 miles south, June, 1938, 1 ♀ (Michelbacher and Ross, C.A.); La Paz, 20 miles northwest, July, 1938, 1 ♂ (Michelbacher and Ross, C.A.), 22 miles west, June, 1967, 1 ♂, 2 ♀ (Sleeper and Fisher, E.L.S.); San Ignacio, 15 miles north, June, 1938, 2 ♀ (Michelbacher and Ross, C.A.); San Jorge, June, 1967, 1 ♀, 5 [elytra only] (Sleeper and Fisher, E.L.S.). Guerrero: 1 ♂ (type of *sharpi*, U.S.N.M.). Hidalgo: Jacala, Aug., 1958, 1 ♂ (H. Howden, C.N.C.). Nuevo Leon: Apodaca, Campo Experimental, May, 1959, 1 ♀ (Hernandez, A.U.C.); China, June, 1957, 1 ♀ (Guerra, A.U.C.); Monterrey, July, 1963, 1 ♂ (A. and H. Howden, H.H.). Puebla: Calcaloapan, 1956, 2 ♂, 1 ♀ (A.M.N.H.); Tehuacan, 4 ♂, 1 ♀ (M.C.Z.), June, 1954, 3 ♂, 1 ♀ (Kissinger, D.G.K.), 82 km. northeast, 1948, 1 ♂ (Werner and Nutting, F.M.). Veracruz: Jalapa, 3 ♂, 1 ♀ (A.M.N.H.); Orizaba, 1 ♂ (B.M.). Zacatecas: Fresnillo, 1947, 7 ♂, 1 ♀ (A.M.N.H.). *United States*: Texas: Brownsville, Cameron Co., 1 ♂ (type of *lentiginosus*, U.S.N.M.), 14 ♂, 14 ♀, 9 with sex not noted (C.A., M.C.Z., E.L.S., B.M., F.M., U.M.); Hidalgo Co., Apr., 1 ♀ (T.A.M.); Houston, Harris Co., 1 ♂, 1 ♀ (C.A., C.N.C.); Welder Wildlife Refuge, near Sinton, San Patricio Co., July, 1964, 1 ♂ (Sweet, T.A.M.); Weslaco, Hidalgo Co., May, 1962, 1 ♀ (T.A.M.); ? College Station, 1 ♀ "locality questionable, student collection" (T.A.M.).

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