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# *Zabrotes maesi*, a New Species from Nicaragua with New Distribution Records for other Bruchids (Coleoptera: Bruchidae: Amblycerinae)

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## Abstract

The **new species** *Zabrotes maesi* is described from Granada, Nicaragua. *Zabrotes maesi* is closely related to *Z. subfasciatus* (Boheman) and *Z. sylvestris* Romero and Johnson. The external surfaces and male genitalia are illustrated for *Z. maesi* and compared with the other two species. Seventeen other species of Bruchidae not reported from Nicaragua are listed along with their known hosts.

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Many studies regarding the behavior and unique control methods of the economic pest of beans *Zabrotes subfasciatus* (Boheman) have been published (*e. g.*, Goossens *et al.* 2000; Ishimoto and Chrispeels 1996; Weaver *et al.* 1994). With the exception of more recent papers by Kingsolver (1990), Romero and Johnson (1999, 2000), the taxonomy of the genus *Zabrotes* has been almost completely ignored by systematic entomologists. In this paper we describe a new species of *Zabrotes* and add information about the bruchids of Nicaragua by providing new data for previously unreported species of (Appendix 1).

The bruchid fauna of Nicaragua has been neglected in scientific studies except for catalogs (Maes and Kingsolver 1991; Maes 1998). In total, only about 90 species of bruchids have been recorded from Nicaragua. Many species in the genus *Zabrotes* are not often reported in the literature though they may be abundant, but are only collected using special techniques. For example, in *Zabrotes*, only *Z. propinquus* (Sharp), *Z. subfasciatus* and the new species, *Z. maesi*, are known from Nicaragua. New data on usually rare bruchids were supplied by J. M. Maes. We interpret and report on them here.

Some studies have used data from Nicaragua though the research was not done specifically on Nicaragua (*e.g.*, Whitehead and Kingsolver 1975; Terán and Kingsolver 1977; Johnson 1983; Johnson and Kingsolver 1970, 1973, 1976, 1988; Johnson and Lewis 1993; Udayagiri and Wadhi 1989; Kingsolver 1980, 1986, 1991; Kingsolver and Johnson 1978; Kingsolver and Whitehead 1974; Nilsson and Johnson 1993; Romero *et al.* 1996; and Hughes and Johnson 1996).

## Materials and Methods

Genitalia were prepared and described using the techniques and nomenclature described by Kingsolver (1970) and modified by Romero and Johnson (1999). The

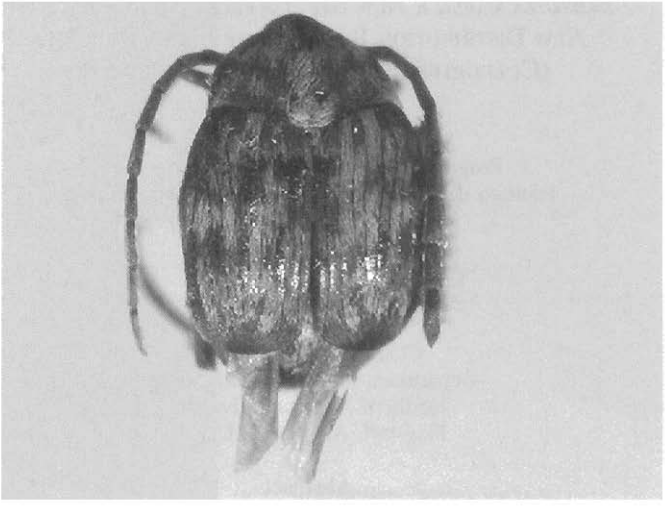


**Fig. 1.** Dorsal aspect of *Zabrotes maesi*.

genitalia were stored in genitalia vials. For distribution records, we used information obtained from specimens collected by J. M. Maes. The records of hosts were obtained from literature and stored in databases maintained by the authors.

## *Zabrotes maesi* Romero and Johnson, **new species**

**Description.** Male. Integument Color. Body black, except antennal segments 1–2, apical portion of labrum, and calcaria yellowish.

Vestiture. Head clothed with whitish pubescence, except for a spot of darker hairs on vertex; pronotum with median lobe with pale hairs, remainder of pronotum with minute brown and yellowish spots, without particular pattern; scutellum whitish; base of elytron with minute brown spots on intervals 2, 4, 6, and humerus, remainder obscure and brown intermixed with small brown and pale maculations, with a sinuous transversal whitish band; pygidium yellowish without a median longitudinal stripe; mesepimeron, metathorax and metepisternum white, metacoxa with intermixed yellowish and brown hairs; abdomen clothed with yellowish pubescence (Figs. 1, 2).

Structure. Head. Vertex and frons finely punctured, with median frontal impunctate carina; ocular sinus 0.75 to 0.80 length of width of eye; antennal segment one 1.5 to 1.87 times as long as segment two, segment eleven 2.0 to 2.3 times as long as segment one. Antenna extending to 1.07 to 1.12 of length of body; ocular index 2.0 to 2.08.

Prothorax. Pronotum semicircular, slightly bulky mesally, micropunctured with foveolae on lateral areas.

Mesothorax and Metathorax. Scutellum triangular and minute. Elytron uniformly micropunctured, without foveolae, 1.84 to 1.87 times longer than wide; striae deep, strial punctures clear, principally on basal portion; stria six straight at base. Metasternum micropunctured and foveolate, with a shallow fossa and thin longitudinal sulcus. Metepisternum finely micropunctured and foveolate. Metacoxal surface foveolate and setose on 0.42 to 0.62 of its lateral surface and length of posterior border, remaining 0.42 to 0.62 impunctate and shining. Metatibia with ventral and lateral carina; mucro of first metatarsal segment 0.10 to 0.15 as long as metatarsus.

Abdomen. Sterna 1–5 finely micropunctured and foveolate, each sternum with a small, black and strong seta; sternum five emarginated at apex; pygidium micropunctured and foveolate.

Length (pronotum-elytra) 1.85–2.0 mm; width 1.37–1.5 mm; maximum thoracic depth 1.0–1.15 mm.

Genitalia. Median lobe with lateral margins parallel, except basal portion wider; ventral valve subcampaniform, with small pores on apical portion; dorsal valve wider at base, sides concave,

**Fig. 2.** Lateral aspect of *Zabrotes maesi*.

narrowing to acuminate apex; armature of internal sac with a median horseshoe-shaped sclerite, surrounded by numerous strong spines (Fig. 3). Lateral lobes 0.61 as long as median lobe, cleft to 0.05 their length, setae at apices moderately elongate (Fig. 4).

Female. Unknown.

**Host Plants.** Unknown.

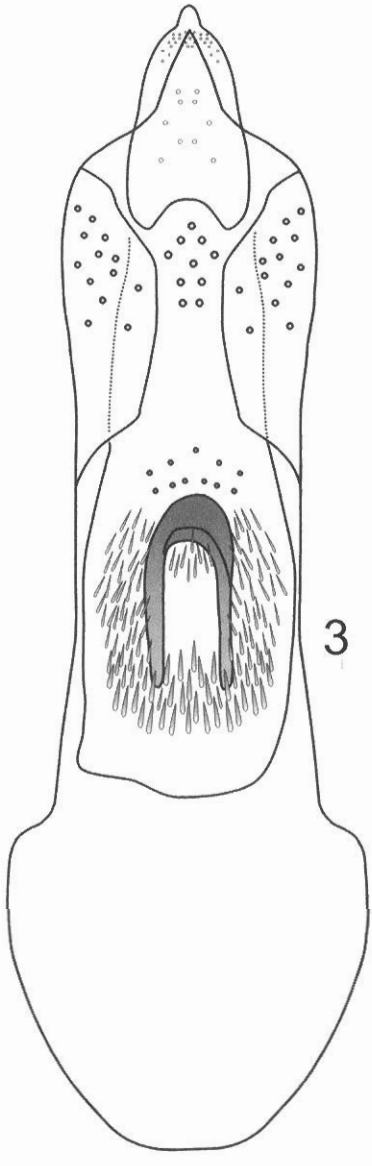
**Type Series.** Male Holotype: NICARAGUA. San Joaquín #1, Volcán Mombacho, Granada, 31-III-1998, J. M. Maes collector, Malaise trap. Paratypes: 1 ♂ Santa Ana #2, Volcán Mombacho, Granada, 30-VI-1998, J. M. Maes collector, Malaise trap; 1 ♂ Santa Ana #1, Volcán Mombacho, Granada, 15-IV-1998, J. M. Maes collector, Malaise trap; 1 ♂ San Joaquín #1, Volcán Mombacho, Granada, 15-IV-1998, J. M. Maes collector, Malaise trap.

Holotype and one paratype deposited in Colección Entomológica del Instituto de Fitosanidad, Colegio de Postgraduados, Mexico. Paratypes also deposited in the following collections: U.S. National Museum of Natural History, Washington, D.C., and the C. D. Johnson collection, Northern Arizona University, Flagstaff, Arizona.

**Etymology.** This species is named in honor of J. M. Maes, diligent collector of the insect fauna of Nicaragua, the types series of *Z. maesi* and other insects used in this study.

## Discussion

For many years separation of *Z. subfasciatus* from the other species in the genus was thought to be simple because it has a fossa on the metasternum (Kingsolver 1990). Romero and Johnson (1999) complicated this when they described *Zabrotes sylvestris*, a new species closely related to *Z. subfasciatus*. The two species are similar because they share patterns of vestiture and some morphological characters such as the fossa on the metasternum. We have now found a third species, described here as *Zabrotes maesi*, that shares patterns of vestiture and some morphological characters including a fossa on metasternum with the first two. *Zabrotes subfasciatus* and *Z. sylvestris* share many external morphological characters (Romero and Johnson 1999, 2000). Some external characters can be used to separate them. *Zabrotes subfasciatus* has a yellowish-brown spot of hairs on the vertex, the pronotum is foveolate on its lateral areas, and the



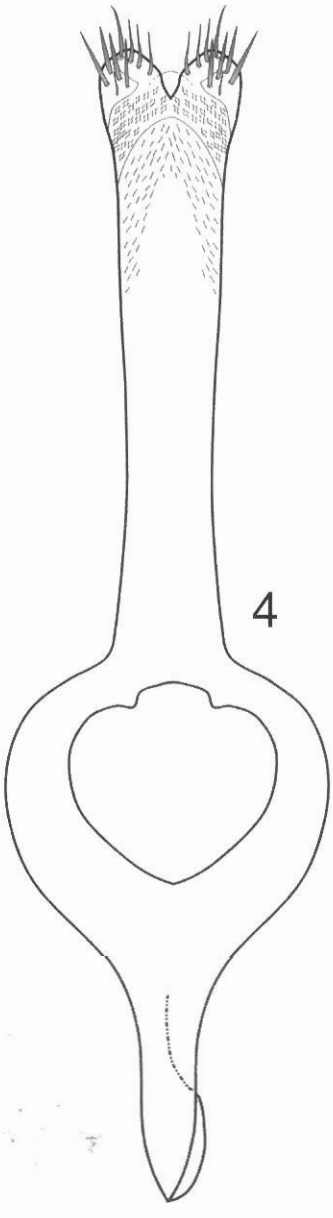




**Fig. 3.** Median lobe, ventral view of *Zabrotes maesi*.

**Fig. 4.** Ventral view of Lateral lobes, basal piece, and tegminal strut of *Zabrotes maesi*.

metatibia has ventral and lateral carinae. *Zabrotes sylvestris* lacks a yellowish-brown spot of hairs on its vertex, the pronotum is foveolate over its entire surface, and the metatibia has only a ventral carina. *Zabrotes maesi* shares these same characters with *Z. subfasciatus*, but differs because the length of the antenna is 1.07 to 1.12 the length of the body, in contrast to *Z. subfasciatus* and *Z. sylvestris* that have shorter antenna that extend only 0.81 to 0.90 the length of the body.

Although there are minor differences in the structure of the male genitalia among the three species, the most reliable characters that separate them are in the structure of the armature of the internal sac of the male genitalia. The internal sac of the male genitalia of *Z. maesi* has armature with a median horseshoe-shaped sclerite surrounded by numerous strong spines (Fig. 3). *Zabrotes sylvestris* has a medial, anvil-shaped sclerite with one group of spines while *Z. subfasciatus* has a medial horseshoe-shaped sclerite accompanied by two groups of spines in the internal sac. (For figures of the male genitalia of the latter two species see Romero and Johnson 1999, 2000). Based on this information we hypothesize the three are sister species with *Z. maesi* closer to *Z. subfasciatus* than to *Z. sylvestris*.

The genitalia of both the male and female of *Z. subfasciatus* and *Z. sylvestris* have distinct differences that separate them. We do not have the female genitalia of *Z. maesi*, so we cannot separate the three species based on these structures.

The host plants of *Z. maesi* are unknown but it probably feeds in the seeds of *Phaseolus vulgaris* or other species of *Phaseolus* as its two close relatives do.

## Acknowledgments

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## Appendix 1

New distribution records of other bruchids in Nicaragua. The host records are from the literature and do not necessarily mean that the bruchids were reared from the seeds of these plants in Nicaragua.

*Acanthoscelides pusillimus* (Sharp)

Distribution: Honduras, Mexico, Nicaragua (Granada), and Venezuela (Johnson 1990).

Host plants: *Dalea* aff. *submontana*, *D. bicolor* var. *naviculifolia* (Hemsley) Barneby, *D. carthagenensis* var. *barbata* (Oersted) Barneby, *D. cliffortiana* Willd., *D. foliolosa* (Aiton) Barneby, *D. leporina* (Aiton) Bullock, *D. leucostachya* var. *eysenhardtioides* (Hemsley) Barneby, *D. scandens* var. *occidentalis*, *D. scandens* var. *paucifolia* (Coulter) Barneby, *D. tomentosa* var. *tomentosa*, *D. zimapanica* S. Schauer. (Johnson 1983, 1989, 1990).

*Amblycerus spondiae* Kingsolver

Distribution: Costa Rica, El Salvador, Guatemala, Mexico, Nicaragua (Granada), Panama. (Romero *et al.* 1996).

Host plants: *Cordia dodecandra* DC., *Hippomane mancinella* L., *Spondias mombin* L., *Ziziphus mexicanus* Rose. (Kingsolver 1990)

*Megacerus cubiculus* (Casey)

Distribution: Mexico, Nicaragua (Granada), United States, Venezuela. (Terán and Kingsolver 1977, 1992; Terán and Johnson 2002).

Host plants: *Convolvulus* sp., *Ipomoea batatas* (L.) Lam., *I. hederifolia* L., *I. incarnata* (Vahl) Choisy, *I. lacunosa* L., *I. purpurea* (L.) Roth, *I. trifida* (Kunth) G. Don, *Merremia quinquefolia* (L.) Hall. (Terán and Kingsolver 1977, 1992).

*Megacerus maculiventris* (Fåhraeus)

Distribution: Argentina, Bolivia, Brasil, Colombia, Costa Rica, Ecuador, Guatemala, Honduras, Mexico, Nicaragua (Granada), Peru, United States, Venezuela. (Terán and Kingsolver 1977, 1992; Terán and Johnson 2002).

Host plants: *Ipomoea aristolochiifolia* (Kunth) G. Don, *I. dumetorum* Willd. ex Roem. and Schult., *I. purpurea* (L.) Roth. (Teran and Kingsolver 1977, 1992).

*Meibomeus wenzeli* Kingsolver and Whitehead

Distribution: Guatemala, Mexico, Nicaragua (Granada). (Kingsolver and Whitehead 1976).

Host plants: *Indigofera densiflora* M. Martens and Galeotti. (Kingsolver and Whitehead 1976).

*Merobruchus chetumalae* Kingsolver

Distribution: Mexico and Nicaragua (Granada). (Kingsolver 1988).

Host plants: *Lysiloma latisiliqua* (L.) Bentham. (Kingsolver 1988).

*Merobruchus hastatus* Kingsolver

Distribution: Costa Rica, Nicaragua (Granada). (Kingsolver 1988).
Host plants: *Piptadenia flava* (DC.) Bentham. (Kingsolver 1988).

*Merobruchus insolitus* (Sharp)

Distribution: Costa Rica, Guatemala, Honduras, Mexico, Nicaragua (Granada), United States, Venezuela. (Kingsolver 1988; Udayagiri and Wadhi 1989).
Host plants: *Acacia angustissima* (Miller) Kuntze, *A. occidentalis* Rose, *A. tenuifolia* (L.) Willd., *Albizia adinocephala* (D. Sm.) Br. et Rose, *A. lebbek* Bentham (Sarin), *A. occidentalis* Brand., *A. plurijuga* (Standley) Britton and Rose, *A. sinaloensis* Britton and Rose, *Chloroleucon mangense* (Jacq.) Britton and Rose, *Havardia pallens* (Bentham) Britton and Rose, *H. sonorae* (S. Watson) Britton and Rose, *Lysiloma acapulcense* (Kunth) Bentham, *L. candida* Brandegee, *L. divaricata* (Jacq.) Macbr., *L. microphylla* Bentham, *L. watsonii* Rose, *Pithecellobium* aff. *mangense*, *P. leucospermum* Brandegee. (Kingsolver 1988; Udayagiri and Wadhi 1989).

*Merobruchus pickeli* (Pic)

Distribution: Brazil, Nicaragua (Managua). (Kingsolver 1988).
Host plants: Unknown.

*Merobruchus porphyreus* Kingsolver

Distribution: Mexico, Nicaragua (Granada). (Kingsolver 1988)
Host plants: *Lysiloma acapulcense* (Kunth) Bentham, *L. divaricata* (Jacq.) Macbr. (Kingsolver 1988; Johnson and Siemens 1997).

*Merobruchus santarosae* Kingsolver

Distribution: Costa Rica, Honduras, Mexico, Nicaragua (Granada) (Kingsolver 1988).
Host plants: *Acacia coulteri* Bentham, *Lysiloma acapulcense* (Kunth) Bentham, *L. divaricata* (Jacq.) Macbr. (Kingsolver 1988; Udayagiri and Wadhi 1989).

*Sennius breveapicalis* (Pic)

Distribution: Brazil, Colombia, Mexico, Nicaragua (Granada), Panama, Trinidad, and Tobago. (Udayagiri and Wadhi 1989).
Host plants: *Senna bicapsularis* (L.) Roxb., *S. fruticosa* (Miller) Irwin and Barneby, *S. undulata* (Bentham) H. Irwin and Barneby. (Udayagiri and Wadhi 1989).

*Stator bixae* (Drapiez)

Distribution: Brazil, Costa Rica, Guyana, Nicaragua, and Peru. (Johnson *et al.* 1989).
Host plants: *Bixa orellana* L. (Johnson *et al.* 1989).

*Zabrotes achiote* Romero and Johnson

Distribution: Bonaire, Colombia, Costa Rica, El Salvador, Mexico, Nicaragua (Granada), Venezuela. (Romero and Johnson 2000).
Host plants: *Acacia angustissima* (Miller) Kuntze, *Bixa orellana* L., *Rhynchosia phaseoloides* (SW.) DC. (Romero and Johnson 2000).

*Zabrotes chavesi* Kingsolver

Distribution: Costa Rica, El Salvador, EUA, Honduras, Mexico, Nicaragua (Chinandega, Granada), and Venezuela. (Kingsolver 1980; Romero and Johnson 2000).

Host plants: *Lysiloma microphylla* Bentham, *Senna bicapsularis* (L.) Roxb., *Senna hirsuta* var. *leptocarpa* (Bentham) H. Irwin and Barneby, and *Senna spectabilis* (DC.) H. Irwin and Barneby. (Romero and Johnson 2000).

*Zabrotes densus* (Horn)

Distribution: Costa Rica, EUA, Guatemala, Honduras, Mexico, Nicaragua (Granada), and Panama. (Romero and Johnson 2000).

Host plants: Unknown.

*Zabrotes interstitialis* (Chevrolat)

Distribution: Costa Rica, El Salvador, Mexico, Nicaragua (), Panama, and Venezuela. (Romero and Johnson 2000).

Host plants: *Cassia grandis* L. f., *C. moschata* Kunth, *Mimosa quadrivalvis* L., *Senna polyphylla* (Jacq.) H. Irwin and Barneby. (Udayagiri and Wadhi 1989).